BIOLOGICAL OPINION

on the

EFFECT OF PROPOSED ACTIVITES ON THE FORT DRUM MILITARY INSTALLATION (2015-2017)

IN THE TOWNS OF ANTWERP, CHAMPION, LERAY, PHILADELPHIA, AND WILNA, JEFFERSON COUNTY
AND
THE TOWN OF DIANE, LEWIS COUNTY, NEW YORK

ON THE NORTHERN LONG-EARED BAT (*Myotis septentrionalis*)

Submitted to the
U.S. Army Garrison Fort Drum

April 28, 2015

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INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) based on our review of the U.S. Army Garrison at Fort Drum's (Army) proposed activities (2015-2017) on the Fort Drum Military Installation (Fort Drum) located in the Towns of Antwerp, Champion, LeRay, Philadelphia, and Wilna, Jefferson County, and the Town of Diane, Lewis County, New York, and their effects on the northern long-eared bat (*Myotis septentrionalis;* NLEB) in accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The Army's September 22, 2014, request for consultation and conferencing was received on September 24, 2014, along with the Biological Assessment (BA) on the proposed activities on Fort Drum Military Installation, Fort Drum, New York (2015-2017), for the Indiana bat (*Myotis sodalis*) and NLEB (Army 2014) (Appendix A). A complete consultation history can be found in Appendix B. The Army determined that all activities addressed in the BA are unlikely to result in adverse effects to the Indiana bat and the Service concurred in our February 18, 2015, letter to the Army. Therefore, this Opinion addresses one species, the NLEB.

Many activities that occur on Fort Drum also involve actions by other federal agencies, such as the U.S. Army Corps of Engineers (Corps) engineering and construction activities, Corps Section 404 of the Clean Water Act permitting, and U.S. Air Force training. Other branches of the Armed Services or federal agencies may also periodically conduct training on Fort Drum. In accordance with 50 CFR § 402.07, the Army is taking the consultation lead for all activities on Fort Drum. The Service has determined that any activities also covered by the Corps permit(s) or conducted by other agencies will not result in any impacts to the NLEB beyond those addressed in this Opinion. Therefore, the Service intends to provide a copy of this Opinion to the Corps, and the Army can provide copies to the other agencies to demonstrate that the Army has fulfilled its obligations to consult with the Service. The Army will inform the other agencies of their responsibilities to comply with all applicable measures in this Opinion.

This Opinion is based on information provided in the BA. A complete administrative record of this consultation is on file at the Service's Cortland, New York, Field Office.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

As defined in the ESA Section 7 regulations (50 CFR 402.02), "action" means "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas." The "action area" is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present federal, State, or private activities, as well as the cumulative effects of reasonably certain future State or private activities within the action area.

The BA evaluated the following categories of activities that are anticipated to occur within the action area between 2015-2017: construction; military training; forest management; mechanical vegetation management; land conversion; use of pesticides; wildlife management/vertebrate pest control; outdoor recreation; and, the Army Compatible Use Buffer (ACUB) program. The Army determined that many activities are not anticipated to result in adverse effects to NLEB: construction (except projects with active season clearing); military training (except smoke/obscurants); forest management; mechanical vegetation management; land conversion; use of pesticides; wildlife management/vertebrate pest control; outdoor recreation; and, the ACUB program.

The Army has included multiple conservation measures to address any potential for adverse effects (see Appendix O of the BA). Given the project description, our joint experience with similar work conducted over the past 6 years, and the proposed conservation measures, the Service concurs with the Army's determination that these activities are unlikely to result in adverse effects. Should project plans change, or if additional information on listed and proposed species become available, this determination may be reconsidered. The Army determined that construction (with active season clearing) and military training (smoke/obscurants) are likely to adversely affect the NLEB. This Opinion analyzes the effects of those two categories of activities.

The Service is not implementing a traditional tiered programmatic consultation approach as sufficient information was provided to analyze impacts for the majority of activities proposed over the next 3 years. However, we anticipate that some projects may not fit the description provided during this consultation or the recently completed informal consultation for Indiana bats and will require individual consultation. We understand the Army will continue to submit annual monitoring reports summarizing activities (not likely to adversely affect [NLTAA] and likely to adversely affect [LTAA]) conducted on Fort Drum and confirmation of implementation of all conservation measures for the NLEB and Indiana bat. The Service will review the Army's annual report to determine if the projects were consistent with the parameters within the BA and Opinion.

The following project background and area descriptions are summarized from the BA. Additional information on Fort Drum background and description can be found in the BA and is incorporated by reference.

Project Description

Fort Drum is the largest military installation in the northeastern United States. It is home of the 10th Mountain Division-Light Infantry and serves as the primary training facility for National Guard and Army Reserve units throughout the region.

Fort Drum officially encompasses 107,265 contiguous acres (43,408 hectares [ha]) in northern New York State (approximate center: 44° 7' N 75° 35' W) (Figure 1).

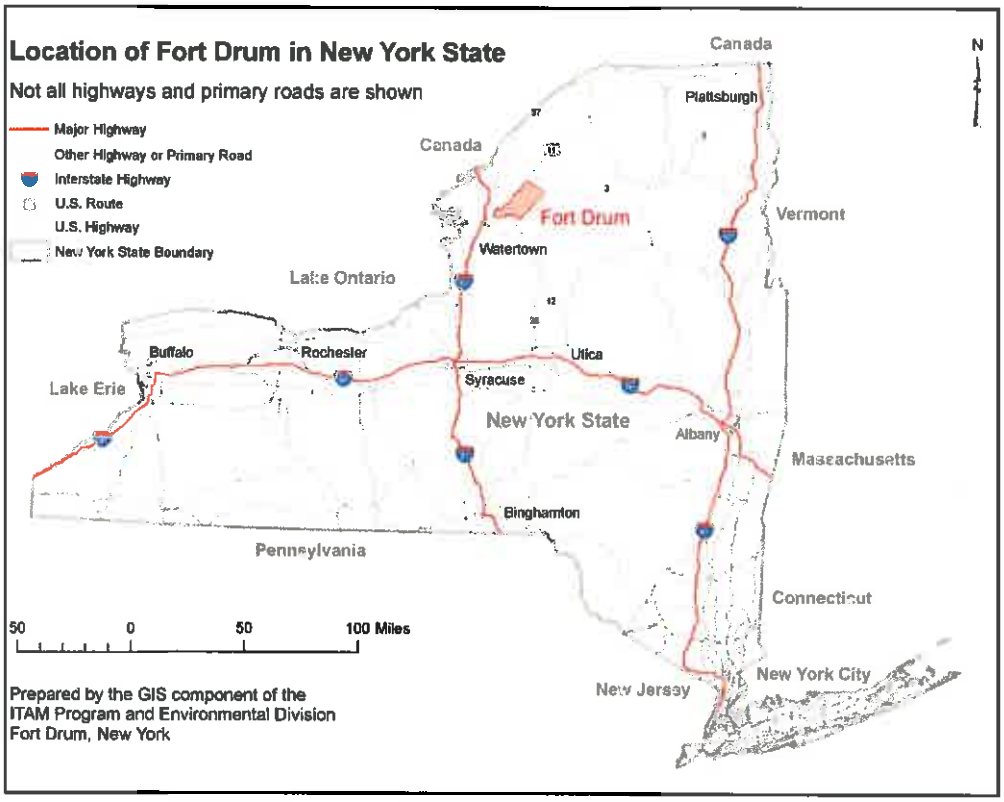

Figure 1. Fort Drum location in New York.

While the official acreage is 107,265 acres (43,408 ha), according to the most recent Geographic Information System coverages, the total acreage is actually 109,024. The installation is 10 miles (16 km) wide and 20 miles (32 km) long. Approximately 83% of Fort Drum is located in the Towns of Antwerp, Champion, LeRay, Philadelphia, and Wilna, Jefferson County, and the Town of Diane, Lewis County, New York (Figure 2).

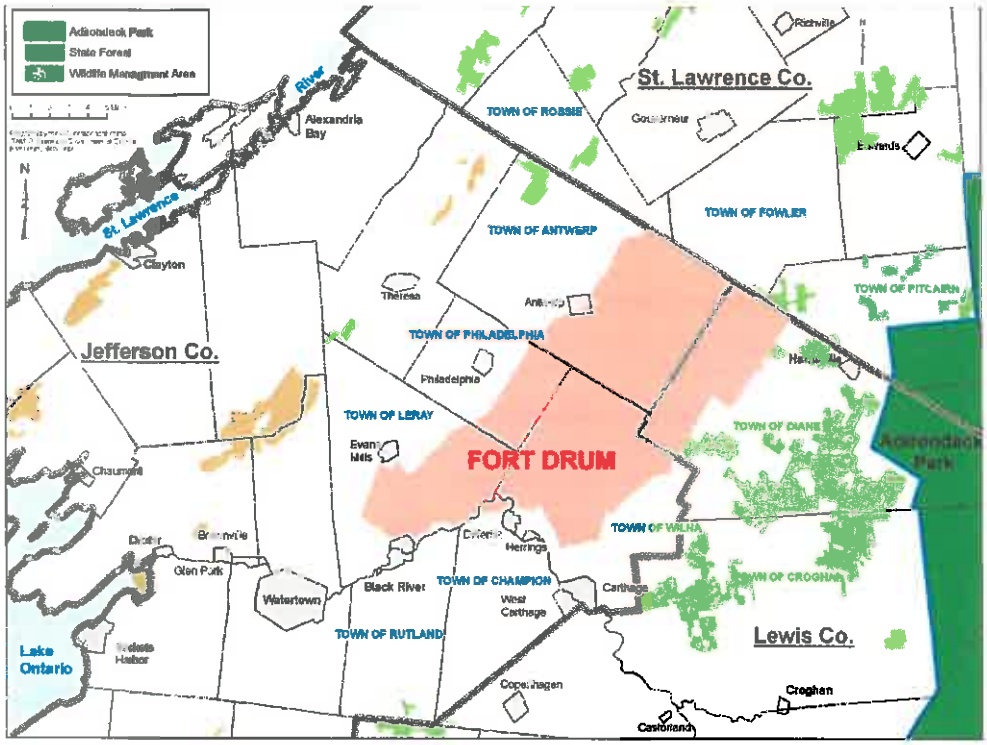

Figure 2. Fort Drum Towns and Counties.

Fort Drum is comprised of the Cantonment Area, Wheeler-Sack Army Airfield (WSAAF), and the Training Area (TA) (including ranges, maneuver area, and the Main Impact Area) (Figure 3). The Cantonment Area and the area surrounding WSAAF consist of administrative offices, housing, maintenance, and troop support facilities. The Cantonment Area (west of Route 26) and areas surrounding the WSAAF are in the southwestern part of the installation and the areas experiencing most of the current and future development. The TA is approximately 96,000 acres (38,850 ha) and where the majority of field training and firing of weapons occurs. The TA is divided into 18 numeric TAs which is further subdivided into 70 alpha-numeric subtraining areas. The Main Impact Area covers 16,951 acres (6,860 ha). Due to the presence of dud and unexploded ammunition, the Main Impact Area is generally off-limits to all personnel. The 2,463 acres (997 ha) TA20 was historically used as an impact area, but it has been surface-cleared of unexploded ordnance. Subsequently, personnel are permitted in TA20.

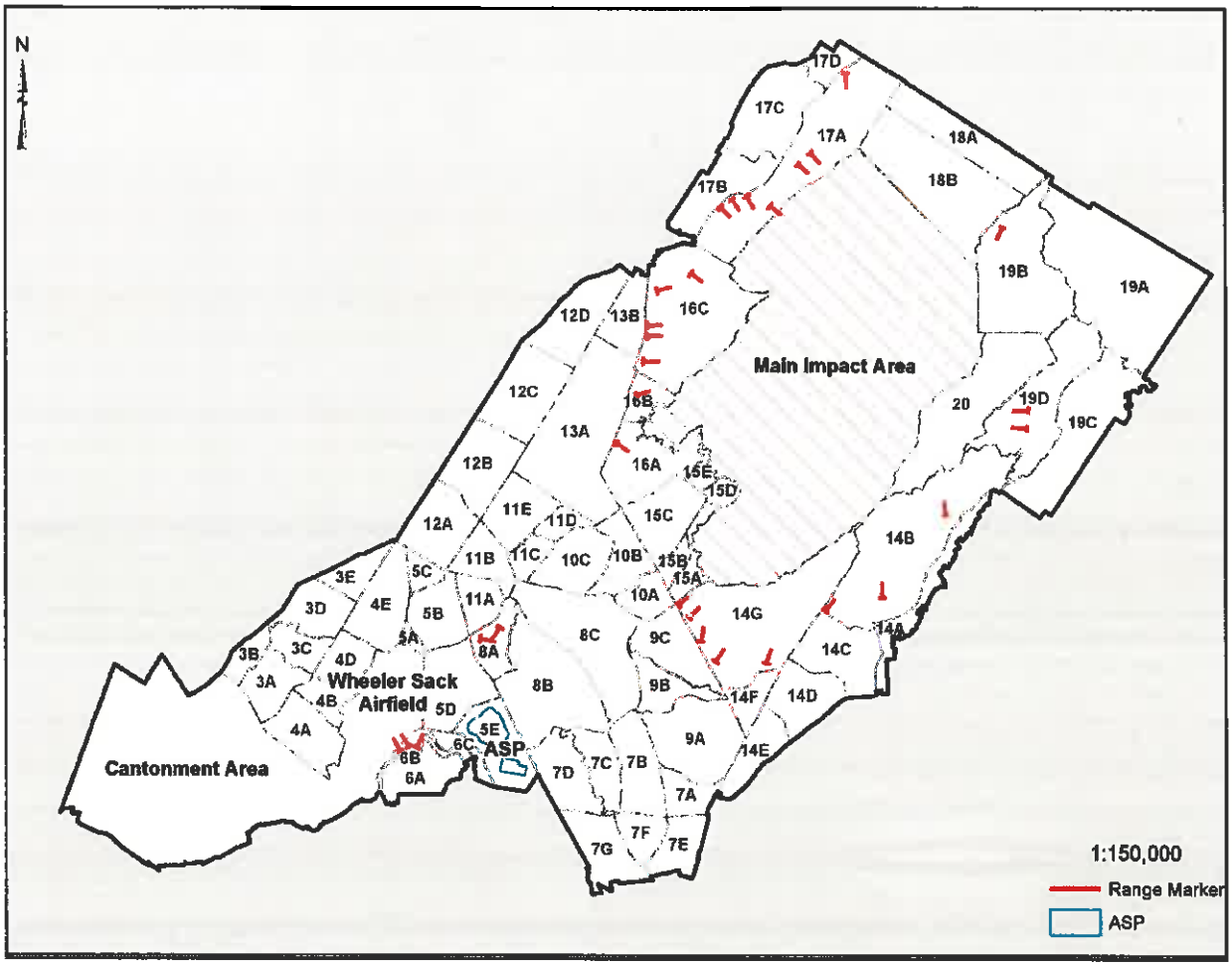

Figure 3. Current map of Fort Drum, including Cantonment Area, Wheeler Sack Airfield, Ammunition Supply Point, Main Impact Area, and Range and Maneuver Areas.

Local Training Areas (LTA) are located primarily within the Cantonment Area (Figure 4). The two largest LTAs are within the boundaries of the Bat Conservation Area (BCA) (See **Non-project Specific Conservation Measures**). The LTAs provide units with an area near their barracks and administrative buildings where low intensity training can be conducted. Unlike the TA where all activities are coordinated through Range Control, utilization of the LTAs is not centrally managed, but activities are regulated by *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas* (FD Reg 350-6). Examples of military training typically conducted in LTAs include field exercises, air operations in approved landing and pickup zones (i.e. open fields), and/or foot and wheeled maneuvers.

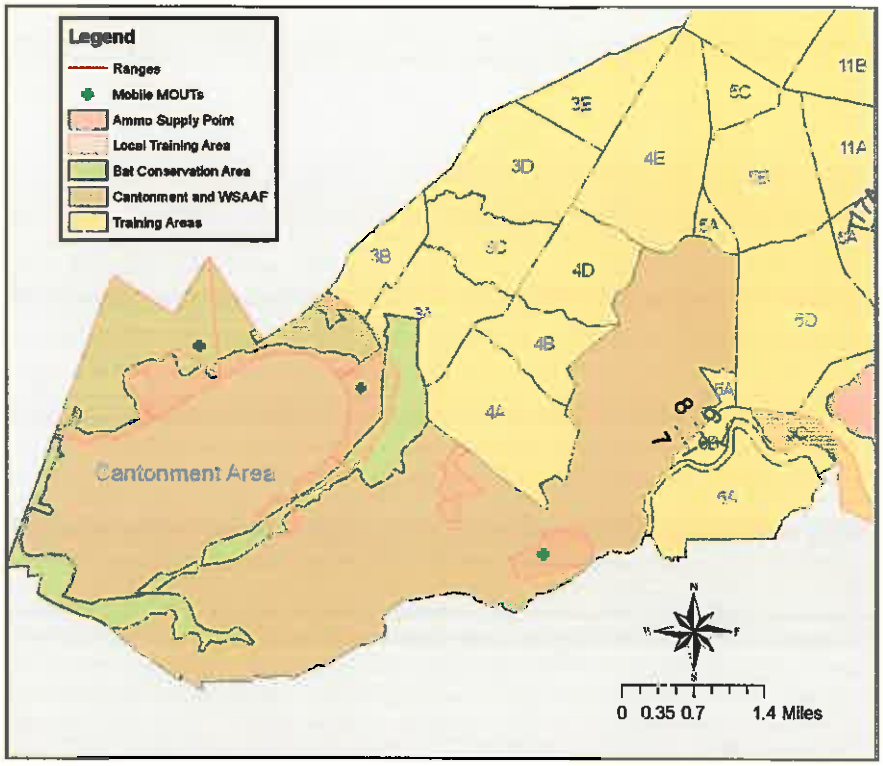

Figure 4. Local Training Areas on Fort Drum.

Forest comprises ~70,000 acres (28,328) of Fort Drum. There are eight primary lakes and ponds totaling more than 400 acres (162 ha) of surface area on Fort Drum. Two ponds, Remington Pond and Conservation Pond, are impounded creeks created by dams. There are two rivers and approximately eight primary streams running through Fort Drum totaling approximately 91.9 miles (147.9 km). Minor streams and tributaries are widespread throughout the installation. Wetlands are prevalent throughout the installation and comprise approximately 20% of the land area on Fort Drum. Approximately 91% of all wetlands on Fort Drum are palustrine.

Proposed Activities

In their BA, the Army outlined activities that may adversely or beneficially affect the NLEB. The Army included conservation measures to minimize potential adverse impacts of various activities as part of their project description. The Service has analyzed the effects of the proposed actions considering that the projects will be implemented as proposed (including all conservation measures). The Army also included a list of "beneficial actions" that they often implement during their actions to minimize environmental impacts. Because the Army was unclear as to how often these beneficial actions may be implemented, the Service did not take those efforts into account when analyzing impacts to the NLEB. But we appreciate the Army's efforts to incorporate these actions whenever possible. This Opinion addresses whether implementation of all activities are likely or not likely to jeopardize the continued existence of the NLEB.

As stated above, the Army determined several categories of activities (including implementation of conservation measures) that may affect, but are not likely to adversely affect, the NLEB bat, and the Service concurs with those determinations. However, the Army determined that construction activities (with active season tree clearing) and military training smoke and obscurants may adversely affect the NLEB. These activities will be discussed further below in addition to a list of general conservation measures that are not specific to any project category.

1. Construction – Active Season Clearing

No land clearing for construction projects will occur between April 16 and August 15 anywhere on Fort Drum. In most cases, no clearing will occur between April 16 and October 15. However, in order to facilitate small, unanticipated training-related projects, the Army may need to clear trees in the TA between August 16 and October 15.

The Army has determined the boundary for clearing trees after August 15 will only occur north and east of the U.S. Military Highway (Figure 5). This area is adjacent to most of the range facilities, and is most likely where small projects covered under this scenario would be sited. While this area is outside the area of known maternity colony use by the Indiana bat, it is within the past known use area of the NLEB.

The Army anticipates up to 10 acres (4 ha) of late summer/early fall clearing per year (with no more than 5 acres total in one contiguous location) during 2015-2017. There may be many combinations of forested habitat removal as part of this requirement (e.g., 2 projects that could remove up to 5 acres [2 ha] each, 5 projects that could remove 2 acres [0.8 ha] each, etc.). Although projects are subject to change, typical projects tend to be adjacent to existing trails or roads and are roughly 2 acres (0.8 ha) in size. Additionally, these projects would be anticipated to occur near existing ranges.

Before construction begins, each project will be evaluated for potential NLEB habitat. If the project site has no suitable roosting habitat (i.e., all trees are less than 3 inches DBH, there are no dead/dying large diameter trees), roosting is unlikely, and there are no potential impacts to roosting bats. If suitable roosting habitat is present and the project cannot be delayed until after October 15, there is the potential that a small number of NLEBs to be present during tree removal activities. All NLEBs will be volant and most would be anticipated to fly away unharmed. However, some bats could be trapped within a cavity or crevice and subsequently crushed and killed.

No construction projects will occur south/west of the U.S. Military Highway between August 16 - October 15. If an action is required south/west of the U.S. Military Highway, then additional consultation is needed with the Service. If Indiana bats are captured north/east of the U.S. Military Highway, then additional consultation is needed with the Service. Further consultation is also needed if a project exceeds 5 acres (2.02 ha) per site or if the cumulative acreage exceeds 10 forested acres (4 ha) per year.

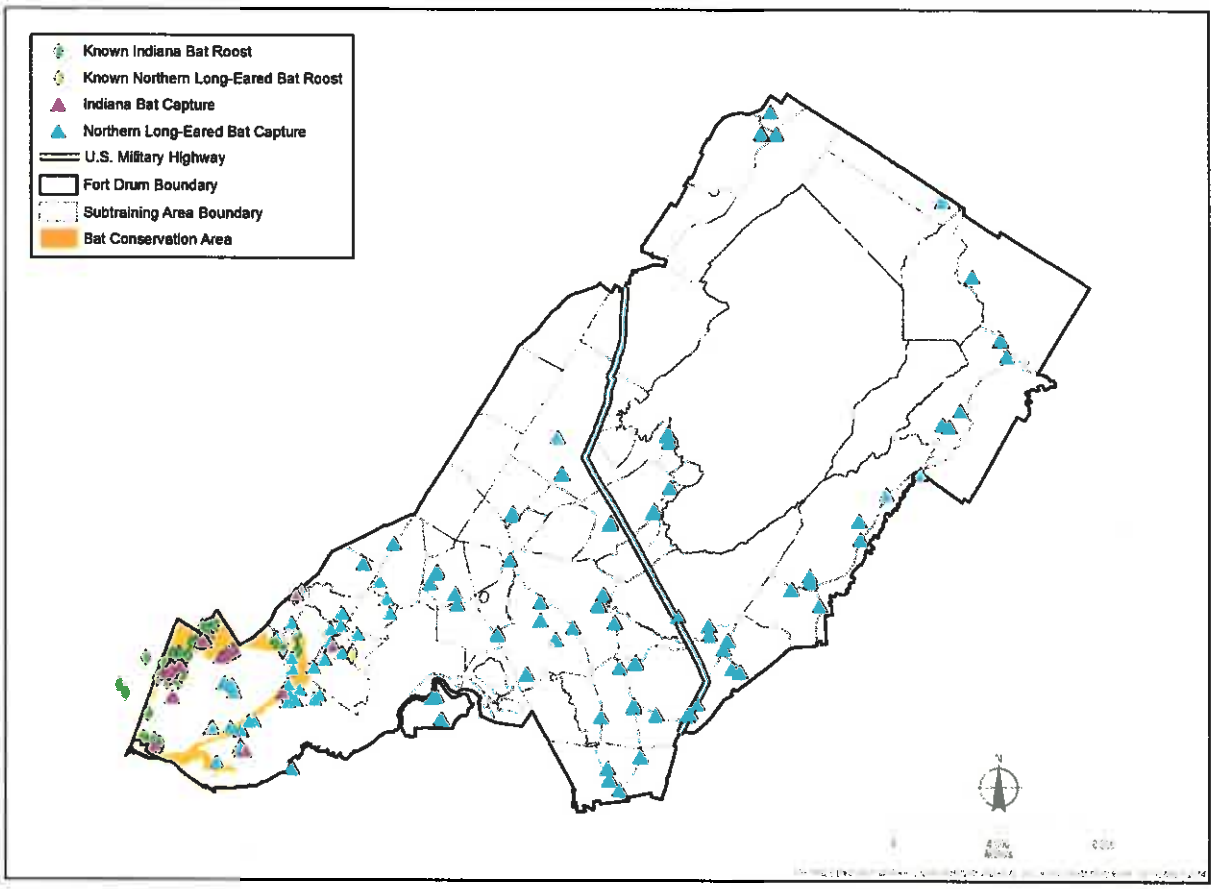

Figure 5. Location of U.S. Military Highway boundary for active season (>August 15) clearing for construction projects on Fort Drum

Conservation Measures for All Construction Activities (from BA)

1. Bat Conservation Area. A 2,200+ acres (890 ha) BCA is established to protect known Indiana bat roosting and foraging areas from permanent development within the Cantonment Area. The BCA attempts to provide connectivity of existing habitat in the Cantonment Area along the West Creek and Pleasant Creek corridors and the relatively undeveloped northern portion of the Cantonment Area where most of the known primary and maternity roosts are known. The BCA accounts for more than 20% of the total land area in the Cantonment Area. See *BA Section 3.1* for more information about the BCA. The BCA will also provide protection for NLEBs within the Cantonment Area.

2. Roost Tree Protection. All female roosts, including roosts identified in the future, will be protected from construction for the lifespan of the roost tree. Additionally, a buffer will be placed around all female roosts to protect the roost from disturbance and to maintain a semblance of a natural environment for Indiana bats and NLEBs. The size and shape of a buffer will be determined on a case by case basis by Fort Drum's Fish and Wildlife Management Program in consultation with the Service. Factors that will be considered

will include surrounding landscape, habitat connectivity, distance to other roosts, distance to known foraging areas, and any other issue important to target species.

3. Time of Year Restriction for Tree Falling. A time of year restriction for clearing trees (> 3 inches DBH) has been established to protect roosting Indiana bats and NLEBs during non-hibernation seasons. For the majority of construction activities (with the exception of active season clearing of up to 10 acres per year as discussed above), felling of trees must take place between October 16 - April 15 while most bats are at the hibernaculum. This will greatly reduce the risk of accidentally harming bats that may potentially be present in trees scheduled to be removed. Specifically, maternity colonies and their associated non-volant young will be protected from disturbance.

4. Flagging or signs will be used to demarcate areas to be cleared vs. not cleared prior to any construction activities for a given project. Flagging will be removed upon completion of the project.

5. Via Environmental Protection Plans, Scope of Works, Contracts, etc., all personnel responsible for construction activities will be informed about the need to follow design plans, stay within flagging, minimize impacts to wildlife, and other environmental concerns.

6. Outdoor Lighting Minimization. For all future projects, Fort Drum will evaluate the use of outdoor lighting and seek to minimize light pollution by angling lights downward or via other light minimization measures following *Appendix P of BA*. High light levels may deter bats from areas as their nocturnal behavior may have evolved in response to predation risks (Speakman 1995, Sparks et al. 2005). By angling the light away from potential foraging and roosting areas, the area will be darker, thus providing bats more protection from predators.

7. Demolition. If the building has pre-existing known bat colonies, then Fort Drum's Fish and Wildlife Management must be contacted before demolition is to occur. If, during the course of demolition, bats of any species are discovered, then all work must cease and Fort Drum's Fish and Wildlife Management Program must be immediately contacted. If bats are identified as Indiana bats or NLEBs, then additional steps will be taken to try and minimize impacts to the species. If the structure is safe to leave as is, then it will be left until after October 15, or until bats have stopped using the structure. If the structure is unsafe and poses a risk to human health and safety, Fort Drum will attempt to exclude the bats immediately. If this is not possible, or bats are found to be using the structure during the maternity season when pups are not volant, the Fort Drum Fish and Wildlife Management Program will contact Service to discuss the most appropriate next course of action.

   NOTE: this may include reinitiation of consultation.

8. Water Quality. All construction activities with ground disturbance greater than 1 acre, (0.4 ha) or that meets another requirement of the New York State Department of

Environmental Conservation (NYSDEC), are required to follow standards in New York State Pollutant Discharge Elimination System: Storm Water General Permit for Storm Water Discharges (Permit No. GP-0-08-001 Issued Pursuant to Article 17, Titles 7, 8 and Article 70 of the Environmental Conservation Law). All construction projects over an acre are required to prepare a sediment and erosion control plan or a storm water pollution prevention plan (SWPPP), which details all erosion and sediment control practices and, when necessary, post-construction storm water management practices. Practices mentioned within the SWPPP will be in accordance with the New York State Stormwater Management Design Manual ("Design Manual") dated August 2003, or the most current version, or its successor. Erosion and sediment controls vary, depending on individual impacts from each project. Some temporary examples of erosion and sediment controls include silt fences, check dams, and sediment traps. Permanent controls may include retention ponds, detention ponds, and grass lined swales. With water quality control measures in place, it is expected that declines in water quality will be minimal and, thus, will continue to provide adequate habitat for Indiana bat/NLEB prey and drinking water for Indiana bats/NLEBs. In fact, water quality may actually improve during the construction of future projects due to new stormwater practices that mitigate for old water quality issues when no conservation measures were required or implemented.

9. Record-keeping and Reporting. For annual reporting purposes, all entities responsible for construction activities on Fort Drum will submit electronic shapefiles of clearing limits to Fort Drum's Fish and Wildlife Management Program. This information will be used to describe vegetative cover types and habitat loss on Fort Drum and will be reported annually to the Service.

2. Military Training Smoke and Obscurants

The only type of military training activity the Army determined has the potential to result in any adverse impacts to NLEB is the use of smokes/obscurants. All other military training activities and any associated conservation measures are not likely to adversely affect the NLEB and are discussed in the BA (Appendix A).

Smoke/obscurants are used to conceal military movements and help protect troops and equipment in combat conditions. They can be used throughout the TA as part of another military operation, or as part of an independent training scenario. Although they would be primarily used during the day, smoke/obscurants may be deployed at night.

For the purposes of this Opinion smoke/obscurants are classified into three categories: Category 1) smoke operations - operations that utilize fog oil to produce large amounts and sustained smoke; Category 2) colored smoke, smoke grenades, and smoke pots (aka pyrotechnics) - items that typically utilize terephthalic acid (TPA) to produce smoke; and, Category 3) smoke munitions - those items that typically utilize white phosphorous (WP) for signaling, screening, and incendiary purposes.

Category 1

Although Category 1 smoke operations have not been utilized on Fort Drum in the past 8+ years, this type of training could occur on approximately 30,000 acres (12,140 ha) of the TA. Smoke training would be rotated regularly among multiple areas to minimize impacts to any one area of the installation. A typical training exercise that uses smoke/obscurants and smoke generators would normally last from 1 to 4 hours. Smoke generators may generate smoke from fixed locations or during mobile operations covering up to several hundred acres or more. Smoke dispersion is variable depending on means of dispersing smoke (i.e., fixed or static) and weather conditions (i.e., wind). Refer to Appendix D for representative examples of fog oil dispersion from static and mobile smoke TAs in Pasquill atmospheric stability category E (3D/International 1997b). Fog oil (i.e., Standard Grade Fuel #2) would be generated the majority of the time, while graphite could also be generated about 25% of the training time (ENSR 2006). Graphite smoke is currently not approved for large scale use on the installation; therefore, it will be excluded from analysis. If a graphite smoke operation is planned, further consultation with the Service will be required.

While no Category 1 operations have occurred in recent years, potentially up to 200 days of training could be conducted using fog oil smoke each year. In those 200 days, approximately 270 generator-hours (number of hours each generator would operate annually x number of generators used on installation) would produce fog oil smoke per year. Approximately 22,120 gallons of fog oil per year could be used on Fort Drum to produce fog oil smoke.

Category 2

The TPA is used in Category 2 floating or ground smoke pots, and in smoke grenades (aka pyrotechnics). The TPA is ignited and burned to produce smoke. The primary combustion products of TPA are carbon monoxide, carbon dioxide, sulfur dioxide, benzene, toluene, and formaldehyde. It is used alone, or in combination with fog oil to fill in incomplete fog oil screens. Smoke grenades would typically generate 30 seconds to 2 minutes of smoke and smoke pots would typically generate up to 5 minutes of smoke. Refer to Appendix D for concentrations of TPA at varying distances (Pasquill Category B).

Category 3

Category 3 WP is used for signaling, screening, and incendiary purposes, and is usually dispersed by explosive munitions. The WP is used only on the Range facilities and in the Main Impact Area. The WP flame produces a hot, dense white smoke composed of particles of phosphorus pentoxide, which are converted by moist air into phosphoric acid. The WP ignites when it is exposed to air and may cause burns. Smoke typically lasts up to 15 minutes.

Conservation Measures for Military Training

1. a) No Category 1 smoke operation will be conducted within 1,000 meters of the installation boundary, public roads, Cantonment Area, ammunition supply point, or WSAAF in accordance with Fort Drum *Regulation 350-4 Range Regulation and*

Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas. This restriction currently protects all known Indiana roosts and the majority of the known maternity use area (i.e., roosting and core foraging area) from close proximity smoke exposure (Figure 6).

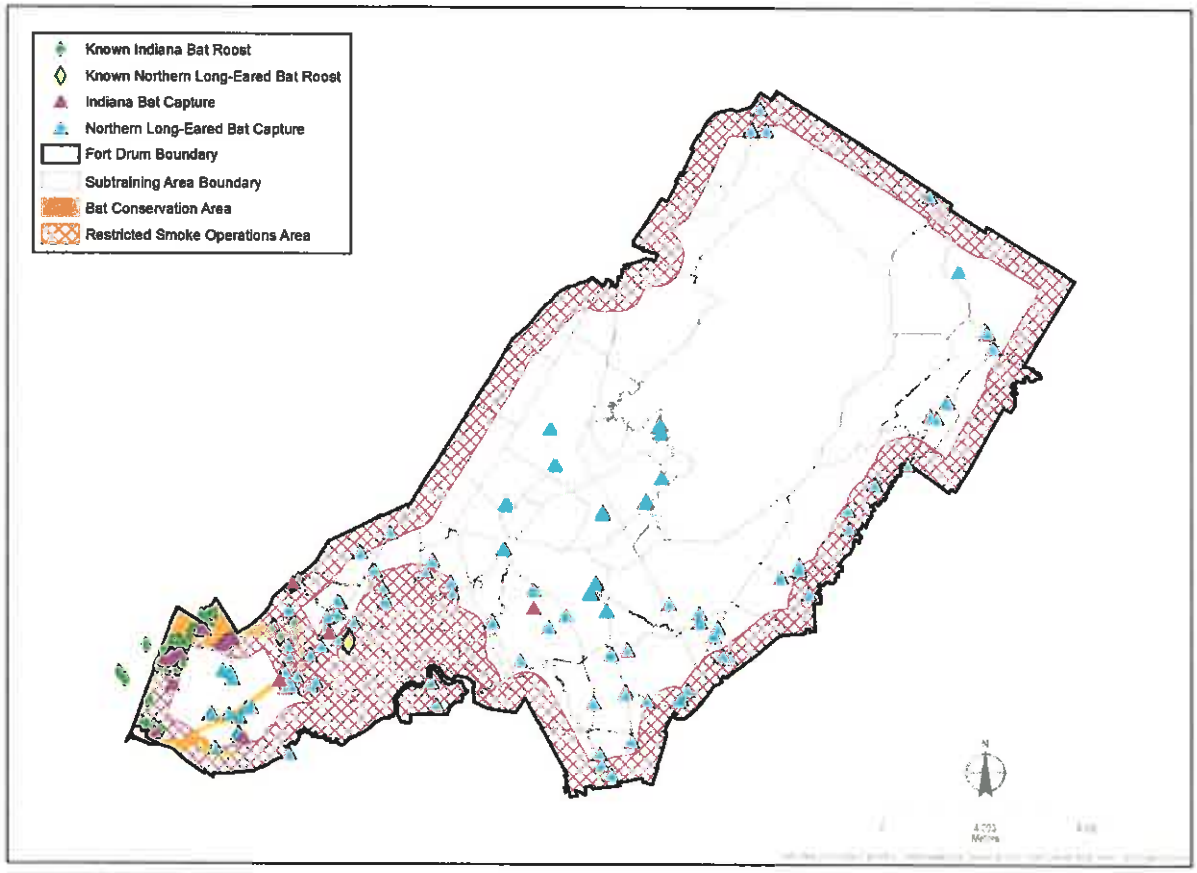

Figure 6. Buffer (1,000 meters [3,281 feet]) around Fort Drum Military Installation where Category 1 smoke operations are prohibited per Fort Drum Regulation 350-4.

b) In the TA, Category 1 smoke and obscurants must be used >100 meters (>328 feet) from any known Indiana bats or NLEB maternity roost areas between April 16 – October 15. This will help to protect current and newly discovered Indiana bats and NLEB roosts into the future. As new roosts are located, these protections will be applied to those as well. The 100 meter (328 feet) buffer serves to minimize the effects of smoke and obscurants by providing distance between the roost and the densest amount of the smoke/obscurants. Training missions will be aware of maternity areas via the National Environmental Policy Act (NEPA) process and will be directed to avoid these areas (*Appendix S - BA*).

c) Category 1 smoke operations must also be rotated among TAs to minimize impacts to any one area.

d) The use of Category 2 smoke (aka pyrotechnics) may be used in the TAs at any time within 1,000 meters of the installation boundary, but will not be used within 100 meters (328 feet) of any known Indiana bat or NLEB roost areas between April 16 - October 15.

e) Category 2 smoke may not be used within 100 meters of any forested areas within the LTAs between April 15 - October 15, (with the exception of use at the mobile military operations in urban terrain [MOUT] areas as identified in f) below). Approval from Range Control and NEPA review is required prior to any use of Category 2 smoke, and these reviews will help ensure that Category 2 smoke use is in accordance with this conservation measure.

f) Category 2 smoke may be periodically used at four mobile MOUTs within the LTAs during April 15- October 15. All mobile MOUTs are currently outside of the BCA, but three are in relatively close proximity (approximately 25, 35, 140 meters, respectively [82, 114.8, and 459 feet]). The fourth is approximately 4,000 meters (2.5 miles) away (Figure 7). Only infrequent use of colored smoke is expected to be used in or around the mobile MOUTs. Category 2 colored smoke used at the mobile MOUTS, no other smoke or obscurant may be used in the BCA.

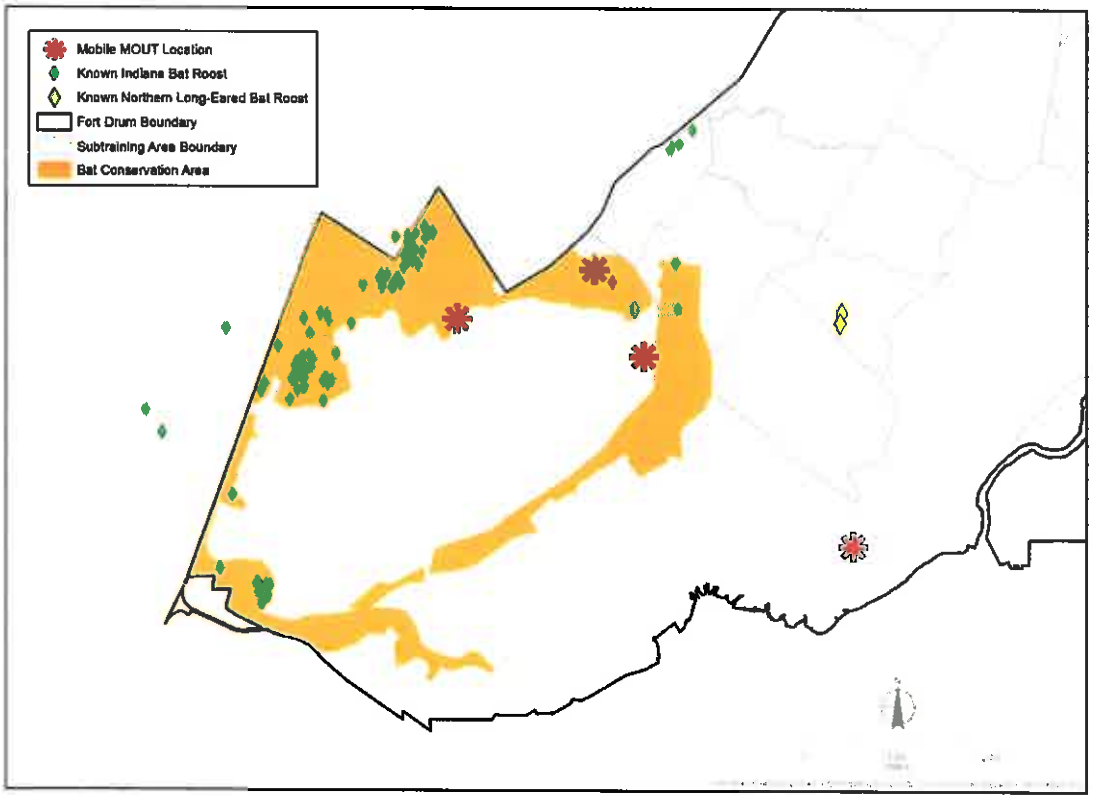

Figure 7. Mobile MOUT Locations in the LTAs Within the Fort Drum Cantonment Area.

2. In the TAs and LTAs, the cutting of trees and tree removal is prohibited without approval by Fort Drum's Forest Management Program in accordance with current environmental guidelines. If approved, actions will be in accordance with all conservation measures in

Section 2.3 of the BA - Forest Management. In general, this is a relatively rare military training action. No female roosts, including roosts identified in the future, will be felled for training for the lifespan of the roost. No tree felling will occur in the BCA for training purposes.

3. In the LTAs, vehicular traffic is restricted to open grassy areas within easy access of the road in accordance with Fort Drum *Regulation 350-6 Assignment and Operational Use of Local Training Areas*. Vehicles are not permitted to cross streams, ditches, wetlands, or dense vegetation in order to reach grassy areas without prior NEPA review, thus, minimizing impacts to natural habitats.

4. In the LTAs, petroleum, oils, and lubricants (POL) operations are prohibited in accordance with Fort Drum *Regulation 350-6 Assignment and Operational Use of Local Training Areas*. This helps to minimize the risk of accidental water/ground contamination.

5. Fort Drum will abide by the Fort Drum Integrated Wildland Fire Management Plan (Fort Drum 2013) which includes fire danger ratings, unless under special circumstances that are approved by the commander. Military activities that may spark fires will not be conducted during moderate to high danger ratings in order to prevent unintentional wildfires. Although unintentional fires will still ignite and burn, this conservation measure will help protect bats from smoke exposure and from roost destruction. Burn bans are most likely implemented during the summer months when reproductive bats are present on Fort Drum.

3. Non-project Specific Conservation Measures

Section 3 of the BA provides a full description of these measures and are summarized here.

A. Bat Conservation Area

A 2,202 acre (891 ha) BCA has been established on Fort Drum for the benefit of Indiana bats (see Figure 7). Although the BCA was initially established for the benefit of Indiana bats, NLEBs have historically been captured throughout the Cantonment Area and within the BCA. This protected area is anticipated to provide similar benefits to the NLEB.

The intention of the BCA is to not prohibit all actions in the identified areas, but to protect known roosting and foraging habitat from permanent loss to the greatest extent possible. Many activities that currently occur will continue to be conducted within the BCA. The following discusses in detail permitted and restricted activities within the BCA.

1. Roost Tree Protection. No viable roost trees identified within the boundaries of the BCA will be felled. This includes roost trees identified in the future.

2. Construction. The primary activity not allowed in the BCA is construction activities resulting in the permanent loss of natural habitat. No permanent facility will be

constructed within the BCA with the exception of some additional facilities (e.g., cabins, picnic shelters, parking lots, a campground, etc.) that may impact up to 7 acres (3 ha) in and around Remington Park. Remington Park is located along the Pleasant Creek corridor of the BCA. The construction of park facilities is included in *Section 2.1 Construction* of the BA. Conservation measures in *Section 2.1 Construction* also apply. Construction of temporary facilities, primarily for training purposes, may be constructed within the BCA if the impacts to habitats are minimal. Temporary structures are defined as structures that are easy to assemble and disassemble, and easy to move.

If construction of other permanent structures must occur within the BCA in the future, further consultation with the Service is required. This has only happened in a few instances since 2009.

Although currently not expected to occur within the next 3 years, the potential exists for the Installation Restoration Program (IRP) to remove trees in order to access contaminated ground water sites in response to a contamination episode. Individual consultation will occur with the Service, and trees would only be removed during the October 16 - April 15 tree clearing window if in a non-emergency situation.

The BCA provides habitat for all sexes and ages of Indiana bats and NLEBs.

3. Military Training. Relatively low impact military training (e.g., land navigation and small unit tactics) is conducted in the northern portion of the BCA within LTAs. No live fire is allowed; however, weapons that fire the equivalent of blanks or paintball rounds are used. Occasionally artillery (with blanks) and other simulated explosives are also used. Current training allowed in the Cantonment Area will continue, which may include the construction of small temporary buildings (e.g., mock villages for urban warfare training) as long as no trees or large areas of natural habitat are removed.

   Category 2 smoke may not be used within 100 meters (328 feet) of any forested areas within the LTAs between April 16 - October 15 to minimize impacts to roosting bats (with the exception of the MOUT sites as identified below). Approval from Range Control and NEPA review is required prior to any use of Category 2 smoke in the LTAs, and these reviews will help ensure that Category 2 smoke use is in line with this conservation measure. See *BA Section 2.2 Military Training* for more information on impacts.

   Category 2 smoke may be periodically used at four mobile MOUTs within the LTAs during April 15- October 15. All mobile MOUTs are currently outside of the BCA, but three are in relatively close proximity (approximately 25, 35, 140 meters, respectively [82, 114.8, 459 feet]). The fourth is approximately 4,000 meters (2.5 miles) away. Only infrequent use of colored smoke is expected to be used in or around the mobile MOUTs. With the exception of the Category 2 colored smoke used at the mobile MOUTS, no other smoke or obscurant may be used in the BCA.

4. Vegetation Management. Limited tree removal is expected as part of required maintenance activities for the perimeter fence and/or utilities (Refer to *BA Section 2.4 Vegetation Management*). This is expected to be no more than 20 acres (8 ha). Hazard trees may also be removed for safety concerns along roadways, trails, or parking areas. Conservation measures in *BA Section 2.4 Vegetation Management* will apply.

   Spraying of herbicides will continue to be conducted along the perimeter fence and utility line corridors to manage vegetation. Conservation measures in *BA Section 2.6 Pesticides* will also apply.

5. Recreation. Most of the BCA is currently used for recreational purposes. The primary recreational use is Physical Training (PT) by soldiers, hiking, and cross-country skiing throughout an extensive trail system, and archery hunting during the big game season.

   There are currently plans to improve the trail system - both in quantity and quality. Any new trails will avoid trees and wetlands if at all possible - if trees >3 inches DBH must be removed, only the minimum required will be removed during the October 16 - April 15 tree clearing window.

6. Natural Resources Management. The management of natural resources is expected to continue throughout the BCA including the control/eradication of invasive species via mechanical, chemical (see also *BA Section 2.7*), biocontrol, and physical removal. Only small areas (no more than 50 acres [20.2 ha] per year, with 25 acres [10.1 ha] in one contiguous block) will be mechanically cut or treated with herbicide. All appropriate conservation measures will be followed regarding the respective treatments. Natural resources surveys, inventories, and research will also continue in these areas. In the future, there may be potential to create or enhance wetland and/or stream mitigation sites (one wetland mitigation site is already located within the BCA), and future forest management activities may occur. Mitigation and forest management activities will be addressed in future consultations, biological assessments, and/or management plans.

B. Monitoring & Research

The Army will continue to assist with white-nose syndrome (WNS)-related or other bat research when requested and/or funding/staff are available.

The Army has participated in multiple on-site studies to assess Indiana bats' use of suitable habitat on Fort Drum and has gained valuable information on the NLEB during these studies. The Army has additional plans to target the NLEB during netting and acoustic surveys in 2015. See Appendix A for specific details.

C. Outreach

The Army has participated in and facilitated several outreach efforts, including publishing articles in local outlets, cooperating with local media, and participating in community and school

events. Army staff have also co-authored multiple papers and conducted multiple presentations on bat research conducted on Fort Drum. See Appendix A for specific details and examples.

D. Conservation Recommendations

The Army has implemented several conservation recommendations (for Indiana bats that may also benefit the NLEB or other bat species) from prior Service Opinions. See Appendix A for specific details.

ACTION AREA

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). For the purposes of this Opinion, the action area includes all of Fort Drum proper, with some exceptions related to the Main Impact Area. Although the Main Impact Area in Fort Drum's TA is considered in some of the proposed actions, no human access is allowed into the area. Radio telemetry studies have not revealed any NLEBs in this area and, given the intense activity (explosions) we find it is unlikely that the species is present and, consequently, will not be adversely affected (discountable risk) by the proposed activities. The action area also includes those lands currently, or proposed to be, part of the ACUB program (i.e., those areas Fort Drum has third party interest in) (Figure 8).

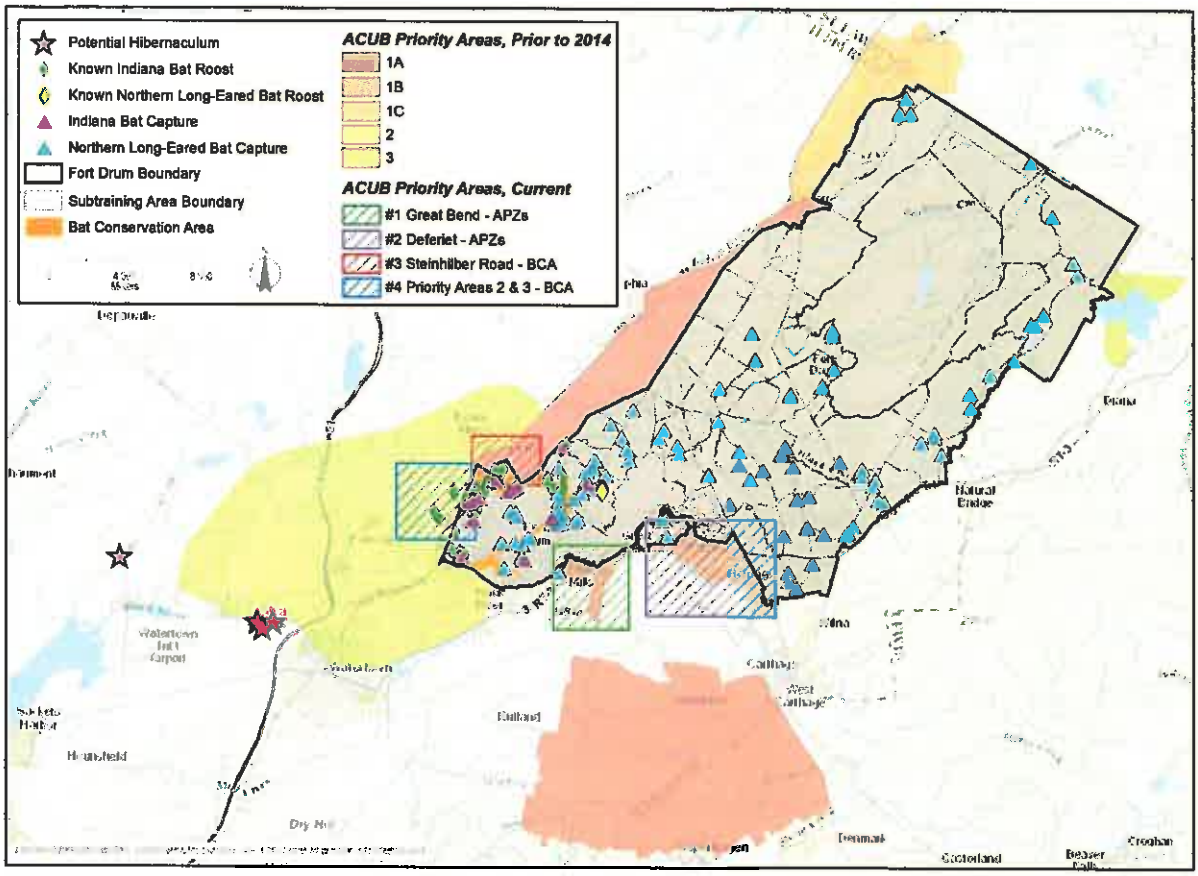

Figure 8. Action Area.

The NLEB may also use lands adjacent to Fort Drum in the Town of LeRay and north (see the **Environmental Baseline**). However, although impacts (specifically lighting pollution and noise) from the Army's actions may affect the NLEB off of the installation in these areas, there is currently no way to accurately determine those impacts on any roosting or foraging NLEBs. In addition, we would not anticipate any unique impacts to bats located off of Fort Drum from those considered in the BA and this Opinion. We would expect the greatest likelihood of exposure to any stressors, and the highest level of frequency and duration of exposure to these stressors, while the bats are on Fort Drum proper.

STATUS OF THE SPECIES

A final rule (80 FR 17974) listing the NLEB as a threatened species was published on April 2, 2015, with an effective date of May 4, 2015.

Refer to the final rule for the best available information on NLEB life history and biology, threats, distribution, and overall status. The following is a summary from that rule.

Life History and Biology

The NLEB is a temperate, insectivorous, migratory bat that hibernates in mines and caves in the winter and spends summers in wooded areas. The key stages in its annual cycle are: hibernation, spring staging and migration, pregnancy, lactation, volancy/weaning, fall migration, and swarming. The NLEB generally hibernates between mid-fall through mid-spring each year. Spring migration period likely runs from mid-March to mid-May each year, as females depart shortly after emerging from hibernation and are pregnant when they reach their summer area. Young are born between mid-June and early July, with nursing continuing until weaning, which is shortly after young become volant in mid- to late-July. Fall migration likely occurs between mid-August and mid-October.

Summer Habitat and Ecology

Suitable summer habitat[1] for the NLEB consists of a wide variety of forested/wooded habitats where they roost, forage, and travel, and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures. This includes forests and woodlots containing potential roosts, as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure.

Many species of bats, including the NLEB, consistently avoid foraging in or crossing large open areas, choosing instead to use tree-lined pathways or small openings (Patriquin and Barclay 2003, Yates and Muzika 2006). Further, wing morphology of the species suggests that they are adapted to moving in cluttered habitats. Thus, isolated patches of forest may not be suitable for foraging or roosting unless the patches are connected by a wooded corridor.

Upon emergence from the hibernacula in the spring, females seek suitable habitat for maternity colonies. The NLEBs actively form colonies in the summer (Foster and Kurta 1999) and exhibit fission-fusion behavior (Garroway and Broders 2007), where members frequently coalesce to form a group (fusion), but composition of the group is in flux, with individuals frequently departing to be solitary or to form smaller groups (fission) before returning to the main unit (Barclay and Kurta 2007). As part of this behavior, NLEBs switch tree roosts often (Sasse and Pekins 1996), typically every 2 to 3 days (Foster and Kurta 1999; Owen et al. 2002; Carter and Feldhamer 2005; Timpone et al. 2010). The NLEB maternity colonies range widely in size, although 30-60 may be most common (Service 2014). The NLEBs show some degree of interannual fidelity to single roost trees and/or maternity areas. Male NLEBs are routinely found with females in maternity colonies. The NLEBs use networks of roost trees often centered around one or more central-node roost trees (Johnson et al. 2012). The NLEB roost networks also include multiple alternate roost trees, and male and non-reproductive female NLEBs may also roost in cooler places, like caves and mines (Barbour and Davis 1969, Amelon and Burhans 2006).

The NLEBs roost in cavities, underneath bark, crevices, or hollows of both live and dead trees and/or snags (typically ≥3 inches DBH). The NLEBs are known to use a wide variety of roost

[1] See the Service's current summer survey guidance for our latest definitions of suitable habitat.

types, using tree species based on presence of cavities or crevices or presence of peeling bark. The NLEBs have also been occasionally found roosting in structures like barns and sheds (particularly when suitable tree roosts are unavailable).

Young NLEBs are typically born in late-May or early June, with females giving birth to a single offspring. Lactation then lasts 3 to 5 weeks, with pups becoming volant (able to fly) between early July and early August.

Migration

Males and non-reproductive females may summer near hibernacula, or migrate to summer habitat some distance from their hibernaculum. The NLEBs are not considered to be a long distance migrant (typically 40-50 miles). Migration is an energetically demanding behavior for the NLEB, particularly in the spring when their fat reserves and food supplies are low and females are pregnant.

Winter Habitat and Ecology

Suitable winter habitat (hibernacula) includes underground caves and cave-like structures (e.g. abandoned or active mines, railroad tunnels). There may be other landscape features being used by NLEBs during the winter that have yet to be documented. Generally, NLEBs hibernate from October to April depending on local climate (November-December to March in southern areas, and as late as mid-May in some northern areas).

Hibernacula for NLEBs typically have significant cracks and crevices for roosting, relatively constant, cool temperatures (0-9 degrees Celsius [32-48 degrees Fahrenheit]), and high humidity and minimal air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible.

The NLEBs tend to roost singly or in small groups (Service 2014), with hibernating population sizes ranging from just a few individuals to around 1,000 (Service unpublished data). The NLEB display more winter activity than other cave species, with individuals have been documented to move between hibernacula throughout the winter (Whitaker and Rissler 1992, Caceres and Barclay 2000). The NLEBs have shown a high degree of philopatry to the hibernacula used, returning to the same hibernacula annually.

Spring Staging and Fall Swarming Habitat and Ecology

Upon arrival at hibernacula in mid-August to mid-November, NLEB "swarm", a behavior in which large numbers of bats fly in and out of cave entrances from dusk to dawn, while relatively few roost in caves during the day. Swarming continues for several weeks and mating occurs during the latter part of the period. After mating, females enter directly into hibernation, but not necessarily at the same hibernaculum as they had been mating at. A majority of bats of both sexes hibernate by the end of November (by mid-October in northern areas).

After hibernation ends in late March or early April (as late as May in some northern areas), most NLEBs migrate to summer roosts. Females emerge from hibernation prior to males. Reproductively active females store sperm from autumn copulations through winter. Ovulation takes place after the bats emerge from hibernation in the spring. The period after hibernation and just before spring migration is typically referred to as "staging", a time when bats forage and a limited amount of mating occurs. This period can be as short as a day for an individual, but not all bats emerge on the same day.

In general, NLEBs use roosts in the spring and fall similar to those selected during the summer. Suitable spring staging/fall swarming habitat consists of the variety of forested/wooded habitats where they roost, forage, and travel, which is most typically within 5 miles of a hibernaculum. This includes forested patches as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Isolated trees are considered suitable habitat when they exhibit the characteristics of a suitable roost tree and are less than 1,000 feet from the next nearest suitable roost tree, woodlot, or wooded fencerow[2].

Threats

No other threat is as severe and immediate for the NLEB as the disease WNS. It is unlikely that NLEB populations would be declining so dramatically without the impact of WNS. Since the disease was first observed in New York in 2007 (later biologists found evidence from 2006 photographs), WNS has spread rapidly in bat populations from the Northeast to the Midwest and the Southeast. Population numbers of the NLEB have declined by 99% in the Northeast, which, along with Canada, has been considered the core of the species' range. Although there is uncertainty about how quickly WNS will spread through the remaining portions of these species' ranges, it is expected to spread throughout their entire ranges. In general, the Service believes that WNS has significantly reduced the redundancy and resiliency of the NLEB.

Although significant NLEB population declines have only been documented due to the spread of WNS, other sources of mortality could further diminish the species' ability to persist as it experiences ongoing dramatic declines. Specifically, declines due to WNS have significantly reduced the number and size of NLEB populations in some areas of its range. This has reduced these populations to the extent that they may be increasingly vulnerable to other stressors that they may have previously had the ability to withstand. These impacts could potentially be seen on two levels. First, individual NLEB sickened or struggling with infection by WNS may be less able to survive other stressors. Second, NLEB populations impacted by WNS, with smaller numbers and reduced fitness among individuals, may be less able to recover making them more prone to extirpation. The status and potential for these impacts will vary across the range of the species.

Bats affected but not killed by WNS during hibernation may be weakened by the effects of the disease and may have extremely reduced fat reserves and damaged wing membranes. These

[2] See suitable habitat definition at http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html

effects may reduce their capability to fly or to survive long-distance migrations to summer roosting or maternity areas.

In areas where WNS is present, there are additional energetic demands for NLEBs. For example, WNS-affected bats have less fat reserves than non-WNS-affected bats when they emerge from hibernation (Reeder et al. 2012; Warnecke et al. 2012) and have wing damage (Meteyer et al. 2009; Reichard and Kunz 2009) that makes migration and foraging more challenging. Females that survive the migration to their summer habitat must partition energy resources between foraging, keeping warm, successful pregnancy and pup-rearing, and healing and may experience reduced reproductive success. In addition, there may be an increased chance of WNS-affected bats being killed or harmed during activities, such as tree removal, early in the spring (April – May) when bats have just returned, have damaged wings, and are exposed to colder temperatures when torpor is used more frequently.

Over the long-term, sustainable forestry benefits the NLEB by maintaining suitable habitat across a mosaic of forest treatments. However, forest practices can have a variety of impacts on the NLEB depending on the quality, amount, and location of the lost habitat, and the time of year of clearing. Depending on their characteristics and location, forested areas can function as summer maternity habitat, staging and swarming habitat, migration or foraging habitat, or sometimes, combinations of more than one habitat type. Impacts from tree removal to individuals or colonies would be expected to range from indirect impact (e.g., minor amounts of forest removal in areas outside NLEB summer home ranges or away from hibernacula), to minor (e.g., largely forested areas, areas with robust NLEB populations), to significant (e.g., removal of a large percentage of summer home range, highly fragmented landscapes, areas with WNS impacts).

Lastly, there is growing concern that bats, including the NLEB (and other bat species), may be threatened by the recent surge in construction and operation of wind turbines across the species' range. Mortality of NLEBs has been documented at multiple operating wind turbines/farms. The Service is now working with wind farm operators to avoid and minimize incidental take of bats and assess the magnitude of the threat.

Rangewide Status and Distribution

The NLEB ranges across much of the eastern and north central United States, and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia (Nagorsen and Brigham 1993; Caceres and Pybus 1997; Environment Yukon 2011)(Figure 9). In the United States, the species' range reaches from Maine west to Montana, south to eastern Kansas, eastern Oklahoma, Arkansas, and east through the Gulf States to the Atlantic Coast (Whitaker and Hamilton 1998; Caceres and Barclay 2000; Amelon and Burhans 2006). The species' range includes the following 37 States (plus the District of Columbia): Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming. Historically, the species has been most frequently observed

in the northeastern United States and in the Canadian Provinces of Quebec and Ontario, with sightings increasing during swarming and hibernation (Caceres and Barclay 2000). However, throughout the majority of the species' range it is patchily distributed, and historically was less common in the southern and western portions of the range than in the northern portion of the range (Amelon and Burhans 2006).

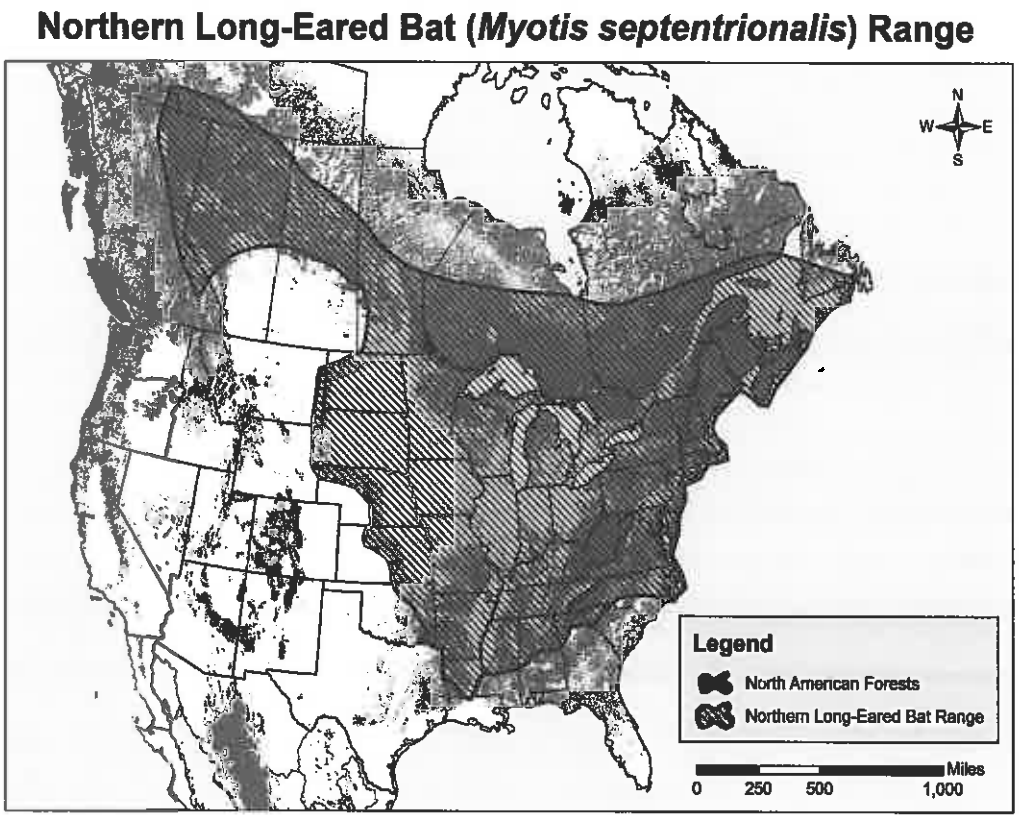

Figure 9. NLEB range.

Although they are typically found in low numbers in inconspicuous roosts, most records of NLEBs are from winter hibernacula surveys (Caceres and Pybus 1997). More than 780 hibernacula have been identified throughout the species' range in the United States, although many hibernacula contain only a few (1 to 3) individuals (Whitaker and Hamilton 1998). Known hibernacula (sites with one or more winter records of NLEBs) include: Alabama (2), Arkansas (41), Connecticut (8), Delaware (2), Georgia (3), Illinois (21), Indiana (25), Kentucky (119), Maine (3), Maryland (8), Massachusetts (7), Michigan (103), Minnesota (11), Missouri (more than 269), Nebraska (2), New Hampshire (11), New Jersey (7), New York (90), North Carolina (22), Oklahoma (9), Ohio (7), Pennsylvania (112), South Carolina (2), South Dakota (21), Tennessee (58), Vermont (16), Virginia (8), West Virginia (104), and Wisconsin (67). The NLEBs are documented in hibernacula in 29 of the 37 states in the species' range. Other states within the species' range have no known hibernacula (due to no suitable hibernacula present, lack of survey effort, or existence of unknown retreats).

The current range and distribution of NLEBs must be described and understood within the context of the impacts of WNS. Prior to the onset of WNS, the best available information on NLEBs came primarily from surveys (primarily focused on Indiana bat or other bat species) and some targeted research projects. In these efforts, the NLEB was very frequently encountered and was considered the most common myotid bat in many areas. Overall, the species was considered to be widespread and abundant throughout its historic range (Caceres and Barclay 2000).

White-nose syndrome has been particularly devastating for NLEBs in the northeast, where the species was believed to be the most abundant. There are data supporting substantial declines in NLEB populations in portions of the Midwest due to WNS. In addition, WNS has been documented at more than 100 NLEB hibernacula in the southeast, with apparent population declines at most sites. White-nose syndrome has not been found in any of the western states to date, and the species is considered rarer in the western extremes of its range. We expect further declines as the disease continues to spread across the species' range.

Overall, the rangewide status of the species is declining.

Critical Habitat

Critical habitat has not been proposed for the NLEB.

Conservation Needs of the Species

The species' conservation needs define what is needed in terms of reproduction, numbers, and distribution to ensure the species is no longer in danger of extinction. The conservation needs should be defined in the species' recovery outline or plan. Since there is no recovery plan or recovery outline available at this time, we will outline the conservation needs based on our current understanding of the species.

We find that the primary conservation need of the NLEB is to reduce the threat of WNS. This includes minimizing mortality in WNS-affected areas, and slowing the rate of spread into currently unaffected areas. In addition, NLEBs that continue to exist within WNS-affected areas need to be able to continue to survive and reproduce in order to stabilize and/or increase the populations. This can be done by reducing the other threats to the species, as listed above. Therefore, efforts to protect hibernacula from disturbances need to continue. This should include restricting human access to hibernacula, particularly during the hibernation period, constructing and maintaining appropriately designed gates, and restoring microhabitat conditions in hibernacula that have been altered. Efforts should also be made to protect and restore (in some cases) adequate fall swarming habitat around hibernacula. Known maternity habitat should be maintained, and the removal of known roost trees, particularly when pregnant females and/or young are present, should be reduced. Research to identify important hibernacula and summer areas and to delineate the migratory relationship between summering and wintering populations should also be pursued.

Status of the Species in New York

Hibernating Population

In New York, the NLEB was historically one of the most widely distributed hibernating bat species in the State, identified in 90 out of 146 known bat hibernacula (NYSDEC 2014, in litt.).

New York is considered the epicenter for WNS, and the disease was first found in the State in the winter of 2006–2007. The NYSDEC confirmed that the decline experienced by this species due to WNS is both widespread and severe in the State (NYSDEC 2014, in litt.). The NYSDEC completed surveys at 18 NLEB hibernacula during the winter of 2012-2013 and documented only 14 NLEBs. Historically, these sites held a maximum total of approximately 1,151 NLEBs. This represents an approximate 99% decline in the species at these locations (NYSDEC, unpublished data).

Summer Population

Potential summer habitat occurs throughout much of New York. The species has also been observed in summer mist-net and acoustic surveys. Capture rates ranged from 0.21-0.47 NLEBs per net night in 2003-2008 to 0.01 NLEBs per net night in 2011 (Herzog 2012, unpublished data), resulting in a 95.2-97.9% reduction in capture rates comparable to the observed winter declines. There are few long-term data sets for NLEBs across the State, but one such site is at Fort Drum **(see Environmental Baseline)**.

Critical Habitat

There is no critical habitat proposed for the NLEB at this time.

Threats

The primary threats to NLEBs in New York at this time are WNS, energy development (wind power, natural gas), and residential and commercial development that fail to incorporate measures to maintain suitable NLEB habitat or avoid and minimize impacts to maternity colonies and swarming bat populations.

ENVIRONMENTAL BASELINE

The Environmental Baseline analyzes the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and the ecosystem within the action area.

Status of the Species Within the Action Area

Winter Hibernation/Spring Staging/Fall Swarming

There are no known NLEBs hibernacula on or within 5 miles of Fort Drum. No NLEBs are anticipated to occur on Fort Drum during winter hibernation, spring staging, or fall swarming.

Summer

The following information is summarized from the BA which is incorporated by reference.

The NLEBs were confirmed on Fort Drum in 1999 when a small scale mist net survey identified four bats (two post-lactating adult females, one lactating adult female, and one juvenile male) in the TA.

Acoustic surveys from 2003-2014 have identified suspected use of NLEBs across most of Fort Drum (Figure 10). Summer mist net surveys during 2007-2014 that were completed to record any Indiana bat species presence, to assess the summer status of Indiana bats, and to locate Indiana bat maternity colonies on the installation, also documented extensive use of the installation by NLEBs (Figure 11).

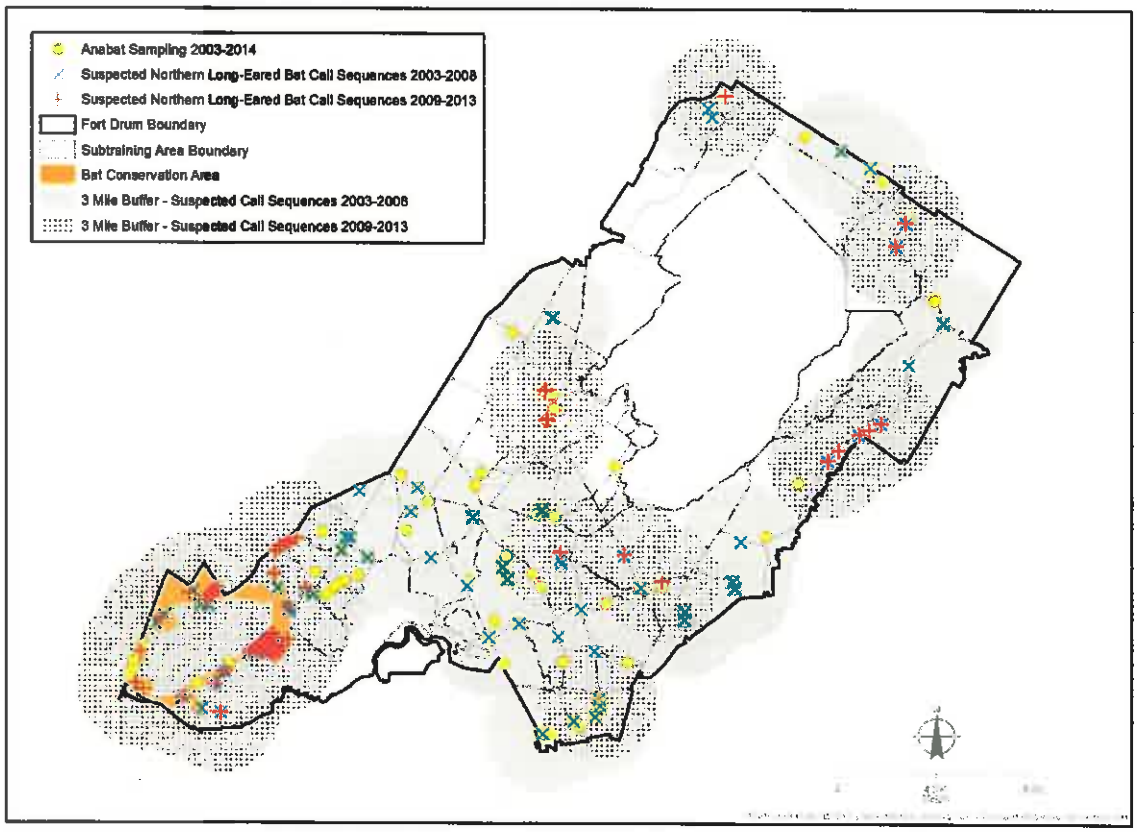

Figure 10. Suspected acoustic detections of northern long-eared bats pre-WNS (2003-2008) and post-WNS (2009-2013) on Fort Drum Military Installation.

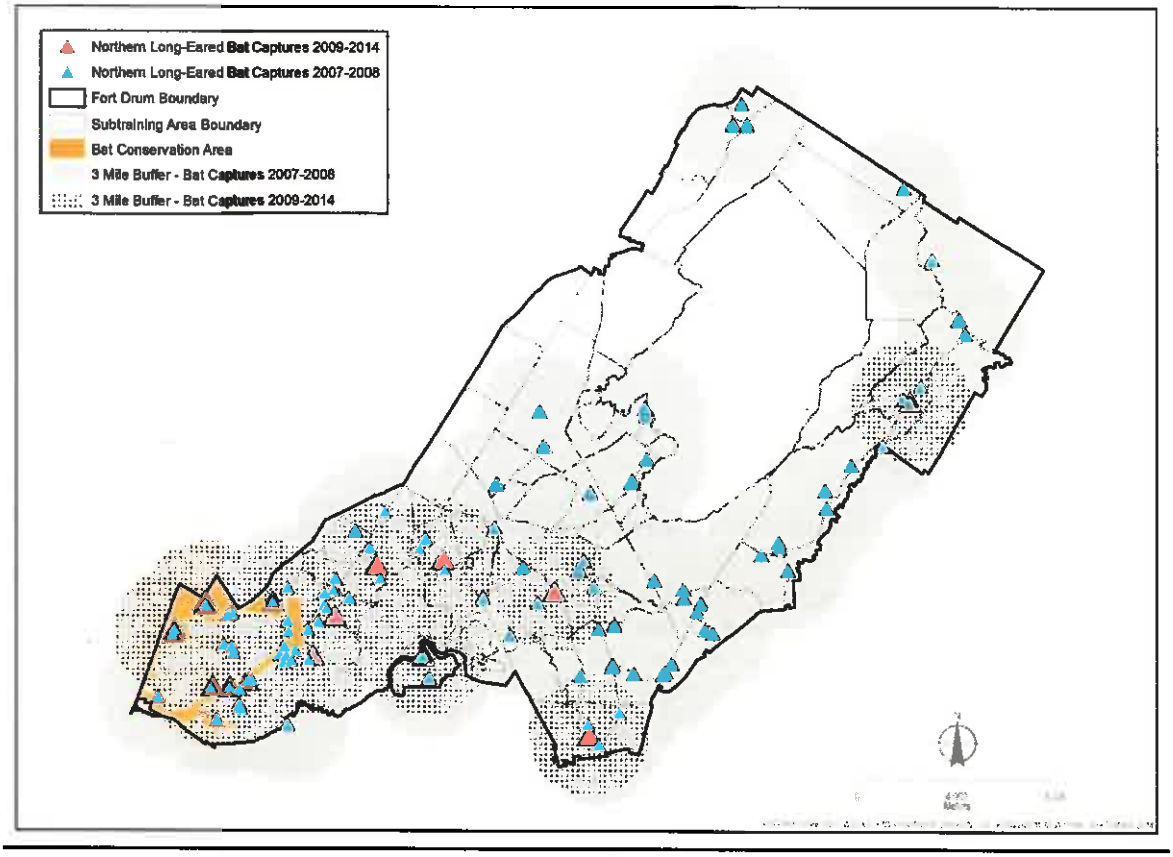

Figure 11. Northern long-eared bat captures pre-WNS (2007-2008) and post-WNS (2009-2014) on Fort Drum Military Installation.

From 2007-2014, mist net surveys were conducted at 323 sites on Fort Drum. Of the 323 sites, 246 sites were surveyed once, while the remaining 77 sites were surveyed two or more times. In the summer of 2007, 1,369 bats were captured, of which, 260 were NLEBs (ESI 2008b). Seventy nine NLEBs were captured in the Cantonment Area and 181 were captured in the TAs. In 2008, mist net surveys were concentrated in the TA and captured 380 bats, including 37 NLEBs (Copperhead 2009). In 2009, 391 bats were captured in the TA, including 5 NLEBs (ESI 2010). In 2010, 647 bats were captured across Fort Drum, of which, 5 were NLEBs (ESI 2011). In 2011, 456 bats were captured across Fort Drum, of which, only 1 was a NLEB, an adult male (JECS 2012). The Army is currently standardizing the information to calculate capture rates across all projects. The only calculations we can make are the percentage of NLEB/total bats captured each year which ranged from 19% in 2007 to 0.2% in 2011, or a 99% decline.

The only known NLEB roosts on the property were documented August 6-10, 2010, when one of the juvenile females was radio-tracked to three different roosts in TA 4 (See Figure 8). Emergence counts ranged from 2-4 individuals over the 5 days it was tracked.

In addition to the above summer mist net surveys, a fall mist net survey was conducted in 2007 to opportunistically monitor the Cantonment Area. The study resulted in the capture of 35 bats, of which, 23 were NLEBs (ESI 2008a).

In 2008 and 2009, a more extensive project was initiated with the U.S. Forest Service and West Virginia University to capture and intensively radio-track Indiana bats in the Cantonment Area to determine foraging areas and roost locations during spring, summer, and fall. As part of this effort, 68 NLEBs were captured (USFS 2011).

In addition to the studies above, small scale mist net surveys were completed by Army staff between 2007-2014. During that time, 5 additional NLEBs were captured.

Based on these survey efforts and acoustic detections across Fort Drum (Figures 10 and 11), it appears that the installation was historically used quite extensively and likely held high numbers of individuals and maternity colonies. However, after the impacts from WNS, acoustic detections have decreased and captures across the landscape have plummeted (~95% reduction) (Ford et al. 2011). A NLEB has not been captured in a mist net since 2011, and current acoustic survey work is only picking up small numbers of suspected NLEB calls in some areas of Fort Drum.

To estimate the number of NLEB maternity colonies on Fort Drum we consider the amount of suitable habitat, home range size, and WNS-related reductions. Approximately 70,000 acres of forest occur on Fort Drum (excluding the Main Impact Area) and individual NLEB home ranges have been minimally estimated at 148.8-173.7 acres (60.2-70.3 ha) (Owen et al. 2003, Lacki et al. 2009). If we assume that all forest habitat is suitable for NLEBs and we use a home range size of 150 acres, Fort Drum may have provided habitat for approximately 467 NLEB maternity colonies. Observed reductions in NLEB summer capture rates across New York (similar to that observed on Fort Drum) have ranged from 95.2%-97.9% giving us an estimated 9-23 NLEB colonies on Fort Drum. All but one of the NLEB captures has occurred west of the U.S. Military Highway. Acoustic detections have occurred throughout the installation.

We anticipate that NLEB use of the Main Impact Area is unlikely for either roosting or foraging given the concentrated activity within the BCA and routine noise and fire from live fire within the Main Impact Area. Therefore, we do not anticipate any adverse effects to NLEBs from activities conducted within the Main Impact Area.

Conservation Needs of the Species in the Action Area

The conservation needs of the species in the action area are similar to the needs rangewide. Fort Drum provides habitat for summering NLEBs, and NLEBs at Fort Drum have already been affected by WNS. Therefore, within the action area the conservation needs include: 1) providing suitable habitat conditions for NLEB foraging, and roosting; 2) maintaining suitable habitat conditions in identified maternity areas and reducing the removal of roost trees; and, 3) determining post-WNS areas of maternity activity.

Overall, the status of the species in the action area is declining.

EFFECTS OF THE ACTION

"Effects of the action" refers to the direct and indirect effects of an action on listed species or critical habitat, together with the effects of other activities interrelated and interdependent with that action which will be added to the environmental baseline. The ESA defines indirect effects as those caused by the proposed action and that are later in time, but are still reasonably certain to occur (50 CFR §402.02). Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

Our analysis of effects for NLEBs entails: (1) evaluating individual NLEB exposure to action-related stressors and response to that exposure; (2) integrating those individual effects (exposure risk and subsequent response) to discern the consequences to the populations to which those individuals belong; and, (3) determining the consequences of any population-level effects to the species rangewide. If, at any point, we demonstrate that the effects are unlikely, we conclude that the agency has ensured that their action is not likely to jeopardize the continued existence of the species and our analysis is completed.

Analyses of Effects of the Action

Effects to Hibernating Bats and/or Hibernacula

Neither direct, nor indirect effects are anticipated to occur to wintering NLEBs or their hibernacula from the proposed action because there are no known NLEB hibernacula within the action area.

Effects to Bats During Fall Swarming and/or to Fall Swarming Habitat

Neither direct nor indirect effects are anticipated to NLEBs during fall swarming or fall swarming habitat because there are no known NLEB hibernacula within 5 miles of the action area.

Effects to Bats During Spring/Summer and/or to Spring/Summer Habitat

1. Construction – Active Season Clearing

Death/Injury

Risk of death or injury of individual NLEBs from tree removal varies depending on the timing of activities, the location, type of harvest, and extent of removal.

The timing of tree removal greatly influences the likelihood of exposure and the extent of impacts on individual bats and their populations. Female NLEBs typically roost colonially, with their largest population counts occurring in the spring, presumably as one way to reduce thermal costs for individual bats (Foster and Kurta 1999). While bats do have the ability to flee their roosts during tree removal, removal of occupied roosts during the active season while the bats

are present (spring through fall) will also likely cause injury or mortality to those roosting bats. During the entire active season, bats are likely to be injured or killed during the spring months when bats often use torpor (temporary unresponsive state) to survive cool weather and low prey availability. Bats are further likely to be killed or injured during early to mid-summer (approximately June-July) when flightless pups or inexperienced flying juveniles are present. Removal of trees outside these periods is less likely to result in direct injury or mortality when the majority of bats can fly and are more dispersed. No tree clearing will occur before August 16 to avoid impacts to non-volant pups, and all bats should be able to leave the project footprint once disturbance starts. Emergence counts in August at three trees on Fort Drum ranged from 2-4 individuals. Fleeing is not expected to result in take through harassment because feeding, breeding, and sheltering activities will not be impaired.

The location of tree removal also influences the likelihood and extent of impacts. Tree removal outside of NLEB summer home ranges or away from hibernacula (i.e., 5 miles) will not result in death or injury to individuals. The greatest risk of take is associated with projects within known NLEB home ranges (calculated from radio telemetry or estimated based on capture or detection of NLEBs [see Service 2014]) where no or few roost trees have been located. This is because occupancy probability has already been established at 100%, but it is unclear where the core roosting area is located.

The risk of death or injury of bats from tree removal within known home ranges with documented roost trees is less, as some of the trees occupied by roosting bats should be left undisturbed. Only three roosts have been located on Fort Drum to date and none will be cut during in-season clearing activities. Areas outside of known home ranges have some probability of occupancy from 0-100%. As discussed in the **Environmental Baseline**, NLEBs are assumed to occupy 2-5% (1,400-3,500 acres) of suitable habitat, and 9-23 maternity colonies are estimated within the action area. No active season clearing will occur west of the U.S. Military Highway, including the BCA where ~50% of the NLEB activity has occurred. The BA states that typical projects tend to be located adjacent to existing trails or roads or near existing ranges (where there is more frequent noise/activity and less likely that NLEB will be roosting nearby). Removal of 5 acres of forest represents 3.3% of individual NLEB home range, but core roosting areas are smaller than overall home ranges. The minimum roosting area has been calculated at 8.6 ha (21.3 acres) (Broders et al. 2006) with 5 acres totaling 23.5% of this area. Given the low occupancy rates across Fort Drum, we find it unlikely that a small project will occur in the core roosting habitat of a NLEB home range.

Lastly, the likelihood and extent of impacts are influenced by the scope of the tree removal relative to the amount of remaining suitable roosting and foraging habitat. Within a given home range, NLEBs use multiple roosts throughout the season. Therefore, only a certain number of roosts are anticipated to be occupied in any given day and within any given year. Therefore, the risk of encountering roosting NLEBs during a given tree removal project is associated with the percentage of home range impacted. Larger acreages of removal have greater risk than smaller acreages. Projects will clear a maximum of 5 acres in one contiguous location and a maximum of 10 acres across Fort Drum per year, with a maximum of 30 acres over the next 3 years.

In summary, the Army anticipates up to 10 acres (maximum of 5 contiguous acres) of late summer/early fall (August 15-October 15) clearing per year in the TA during 2015-2017. There may be no in-season clearing at all (similar to the past 8 years), or in-season activities may be entirely outside of NLEB home ranges, which is reasonable given that NLEBs occupy 2-5% of suitable habitat on Fort Drum. Neither of these scenarios would result in adverse effects to NLEBs.

As a reasonable worst-case scenario, 1-2 projects may occur within two NLEB home ranges. Based on the proposed action, ~0-2 colonies may experience clearing of up to approximately 5 acres (3.3% of home range). Given the dispersed nature of NLEB colonies in the late summer and early fall, a similar small percentage of a given colony may be exposed to an in-season tree removal project. Of those exposed, most, if not all, individuals are anticipated to exit the tree during construction activities unharmed given the late timing of the activity (all bats are volant and warmer temperatures reduce any need for use of torpor). However, all bats will be forced to flee the project area. Approximately 96% of their home range will be unchanged and no effects beyond the initial fleeing are anticipated (see Response to Removal or Alteration of Roosting/Foraging Habitat below).

Response to Removal or Alteration of Roosting/Foraging Habitat

The Army anticipates up to 10 acres of late summer/early fall clearing per year (with no more than 5 acres total in one contiguous location) during 2015-2017 (for a total of up to 30 acres). Given the small acreage of tree removal, extensive remaining suitable roosting and foraging habitat, and dispersed nature of the projects across multiple sections of the installation, no effects (or insignificant effects) from loss of habitat are anticipated to NLEBs (see Appendix A for more detailed discussion).

2. Military Training Smoke and Obscurants

Smoke and obscurants have the potential to infiltrate bat roost trees (Guelta and Balbach 2005), which may expose NLEBs (volant and non-volant) to potentially harmful chemicals via ingestion, inhalation, or through the skin. The smoke itself may force bats to abandon the roost, and smoke exposure can have harmful effects.

Effects to individual NLEBs from smoke operations varies depending on the type/extent of smoke/obscurant deployed, timing of activities, and the location. As discussed in the Project Description, the Army has classified smoke/obscurants into three categories of use on Fort Drum: Category 1) smoke operations - operations that utilize fog oil to produce large amounts of sustained smoke; Category 2) colored smoke, smoke grenades, and smoke pots (aka pyrotechnics) - items that typically utilize TPA to produce smoke; and, Category 3) smoke munitions - those items that typically utilize WP for signaling, screening, and incendiary purposes. We separate our discussion into the three categories of smoke/obscurants.

Category 1

Direct Effects to Roosting Bats

The timing of smoke operations greatly influences the likelihood of exposure and the extent of impacts on individual bats and their populations. Fog oil exercises are primarily conducted during daylight hours while bats are roosting; however, the BA stated that there is potential for use of smoke at night. Fog oil may be deployed during the NLEB active season (more than 100 meters [328 feet] from known roosts).

The location of smoke operations also influences the likelihood and extent of impacts. No Category 1 smoke operation will be conducted within 1,000 meters of the installation boundary, public roads, Cantonment Area, ammunition supply point, or WSAAF in accordance with Fort Drum *Regulation 350-4 Range Regulation* and Fort Drum *Regulation 350-6 Assignment and Operational Use of Local Training Areas* (Figure 12). This will minimize the likelihood of exposure to NLEBs in unknown roosts in these areas to the point where it is unlikely (discountable).

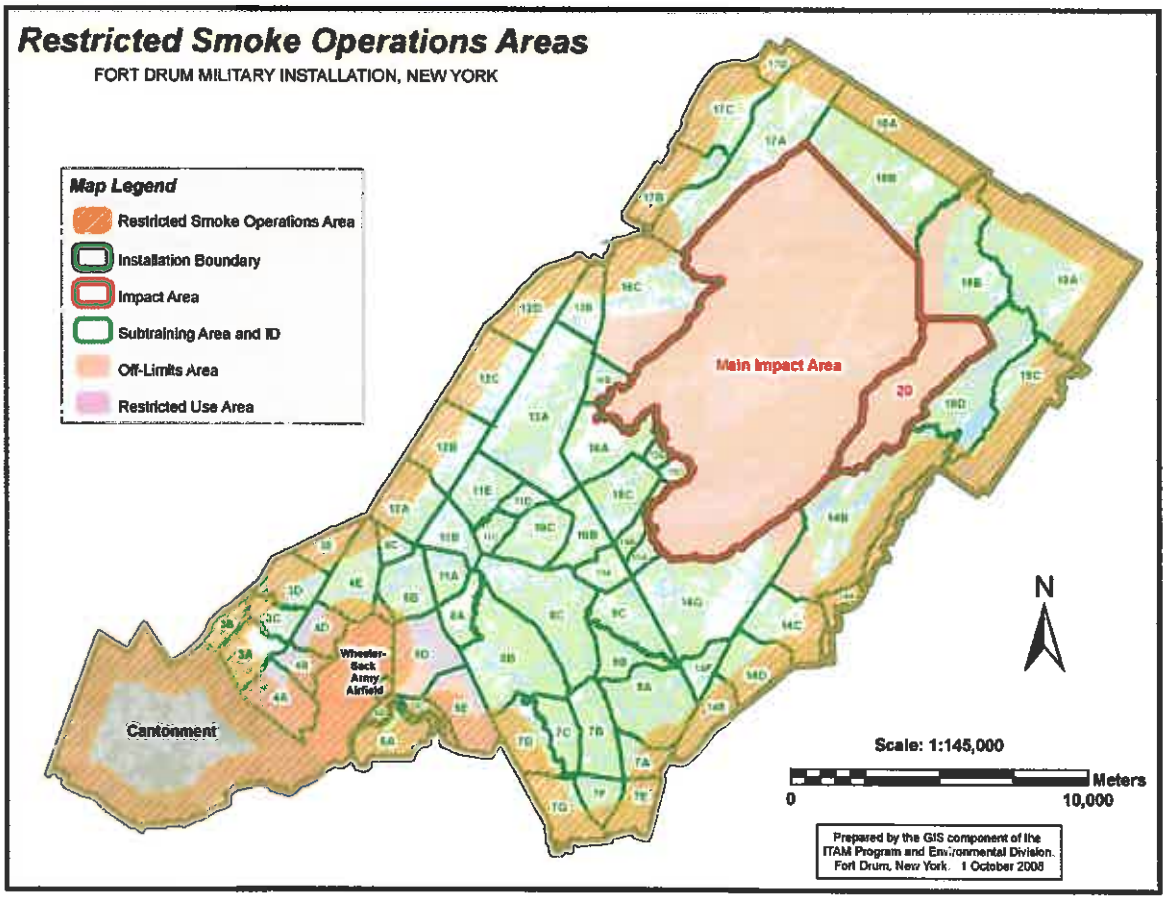

Figure 12. Buffer (1000 m) around Fort Drum where smoke operations are prohibited per Fort Drum Regulation 350-4 Range Regulation.

In the TA, Category 1 smoke and obscurants will be used greater than100 meters from any known NLEB maternity roost areas between April 16 - October 15. This reduces the likelihood of exposure to adult and juvenile NLEBs in all known roosts to point where it is unlikely (discountable).

Category 1 smoke operations will be rotated among TAs to minimize impacts to any one area. The Army's conservation measures greatly reduce exposure risk of NLEBs to fog oil, but it is not completely discountable. Therefore, we must consider the potential effects of exposure. The National Research Council (1997) conducted a review of research on the effects of fog oil on animals and found fog oil has low potential for acute toxicity (dermal exposure), little potential for acute lethality from ingestion, and may cause slight to moderate irritation after a single exposure directly to the skin. Fog oil has very low oral toxicity (3D/International Inc. 1996). Given this, bats would need to ingest large quantities to cause significant impacts. Bats are not anticipated to ingest fog oil during foraging or drinking because fog oil does not persist in soil, sediment, or surface water (3D/International Inc. 1996). Direct exposure of bats to large amounts of fog oil, which would subsequently be ingested while grooming, would not be expected, because we do not anticipate repeated exposure of any individual bat to fog oil. We anticipate volant bats would flush during fog oil deployment (see below). Inhalation is the most likely path of exposure of fog oil for NLEBs.

Inhalation effects from a given smoking exercise are predicted to be transitory, at most 2 hours in duration (Getz et al. 1996). The concentration of fog oil aerosols and rates of deposition are dynamic and highly dependent on local conditions, such as the length of the military training exercise, distance from the source (i.e., generator), wind currents, temperature, humidity, local terrain, and precipitation. Some studies (Driver et al. 1993) have attempted to model the complex atmospheric conditions that affect fog oil smoke dispersion and deposition and determine estimates of fog oil concentrations in the atmosphere that could result from a typical smoke operation. Other studies (Liljegren et al. 1988, Policastro et al. 1989) have attempted to develop more realistic estimates of fog oil by sampling concentrations of fog oil in the field at various distances from the source. Table 1 summarizes both types of studies.

Few bat studies on the effects of volatile gases or suspensions have been conducted. Dickinson et al. (2010) modeled the potential harm of carbon monoxide from controlled burns on roosting bats and determined that dangerous levels were only reached in immediate proximity to intense fires. Studies (summarized in Getz et al. 1996) have examined acute and chronic exposure concentrations of fog oil to small mammals (e.g., mice, guinea pigs, hamsters, and rats). Although limited in scope and applicability, these studies do provide some estimates of impact, should NLEBs be exposed to fog oil at various concentrations. Single 4-hour exposures of 200 mg/m^3 of S.A.E. motor oil smoke to mice and 1-hour exposure of 10-250 mg/m^3 of light lubricating oil smoke to guinea pigs resulted in minor respiratory irritation (Getz et al. 1996). Additionally, Driver et al. (2002) exposed red-winged blackbirds (*Agelaius phoeniceus*) to concentrations up to 400 mg/m^3 that resulted in no adverse impacts to the birds. Similarly, exposure to brown-headed cowbirds (*Molothrus ater*) of cogenerated aerosols of graphite flake and fog oil concentrations of 100 and 120 mg/m^3 for 30 minutes a day for 4 consecutive days, and exposure of red-winged blackbirds to cogenerated aerosols of 285 mg/m^3 and 300 mg/m^3 for

30 minutes a day for 4 consecutive days did not result in any acute effects (mortality, clinical pathology, gross lesions, or behavioral deficits) (Driver et al. 2005).

The concentrations discussed above were 2-4 times greater than the modeled concentrations at 100 meters from the source of deployment and 12-50 times greater than the observed concentrations of fog oil at 100 meters from the source of deployment. Therefore, we would not anticipate any risk of acute toxicity (only minor respiratory irritation) from fog oil inhalation, even as close as 100 meters (328 feet) from deployment.

Table 1. Estimates of fog oil concentrations resulting from typical smoke screening operations at given distances from the source.

Study	Distance from source (meters)	Average (mg/m3)	Range (mg/m3)	Maximum (mg/m3)
Lilegren et al. 1988[A]	100	7.7		
	200	3.6		
	400	2.6		
Policastro et al. 1989[A]	25	116		
	100	8		
	200	3		
Driver et al. 1993[B] (30 min release)	100	64.3	27-120	
	200	51.8	7-140	
	400	27.9	1.8-93	
	1000	6.9	1.6-24	
Driver et al. 1993[B] (300 min release)	100	64		
	200	29		
	400	8.7		
	1000	1.6		
Getz et al. 1996 (120 min release)	100	64	25-102	
	200	56	8-105	
	500	46	1.3-90	
	1000	13	0.8-25	
U.S. Army 1997[B]	100	3.8		13.5
	250	3.5		12.7
	500	2.7		11.2
	1,000	1.2		4.3
Department of the Army 1997 (30 min release)	100		0-14	
	1000		0.1-1	

A- Results from studies conducted in the field
B- Results from **modeling**
Table is summarized from Getz et al. 1996 and ENSR 1999.

As the distance increases to 100 meters, the average concentrations decrease, suggesting that at this distance, fog oil is unlikely (discountable) to reach high enough concentrations to result in the death of any roosting NLEBs.

In order to protect bats in known roosts from high concentrations of fog oil, a conservation measure prohibits smoke operations within 100 meters of known maternity roost trees during the time of year NLEBs are present on the installation (April 16 - October 15). Minimizing the concentration of smoke around maternity roosts at this time will reduce the risk that NLEBs will abandon roosts or non-volant pups. As discussed above, at this distance, NLEBs (including pups) are unlikely to suffer acute effects; however, prolonged and repeated exposure to fog oil may cause adverse pulmonary and systemic effects which could reduce fitness and fecundity of NLEBs (3D/International 1997a). The rotation of smoke/obscurants between areas will reduce NLEBs' risk to chronic exposure to the point where no prolonged exposure and, therefore, no adverse effects are not anticipated (insignificant/discountable).

Given the reduction in populations from WNS, there are few NLEBs remaining on Fort Drum, and the likelihood that NLEBs will be roosting where fog oil operations occur (should any operations occur) is low. However, small numbers of NLEBs may be roosting where fog oil deployment may occur. The NLEBs roosting in close proximity (<100 meter [328 feet]) to fog oil operations would be exposed to higher concentrations of smoke. Dickinson et al. (2009) found that radio-tracked NLEBs flushed shortly (within 10 minutes) after prescribed fire ignition within 20 meters of roosts in the Daniel Boone National Forest in Kentucky on a warm spring day. Deployment of fog oil smoke near roosts would most likely cause adult NLEBs to similarly flush from the roost with minor or no direct injury. However, if smoke operations are in early spring when bats are more likely to enter torpor periodically, some adults may be exposed to a longer duration of smoke, leading to minor respiratory irritation. Also, if smoke operations occur during June/July (when adult NLEBs would be expected to leave the roosts) when there are non-volant pups present that the adults fail to move, these pups may be more susceptible to impacts from smoke and could be injured or killed directly by the fog oil exposure (leading to suffocation), or indirectly by the adults abandoning the roost. If NLEBs flush during the day, that would also pose additional risk of predation to the adults.

Direct Effects to Foraging Bats

As stated above, it is not expected that smoke operations would be conducted during hours that bats will be foraging; however, if they were conducted when bats are foraging, bats have the ability to avoid the smoke and chemicals and are anticipated to forage in adjacent areas, thus limiting exposure. We do not anticipate any short term displacement (should it occur) to rise to the level of an adverse effect to NLEBs given the vast amount of suitable foraging area available on Fort Drum. In addition, should NLEBs continue to forage in the general vicinity of fog oil deployment, at temperatures between 0-40°C, volatization of fog oil exposed to air will result in a 30-40% decrease in fog oil mass within an hour, and 80-90% reduction within a week (Driver et al. 1993). Therefore, it would not be expected that NLEBs would have large amounts of fog oil deposited on their skin and fur to be ingested while grooming. Given all these considerations, the likelihood that there will be adverse effects to foraging NLEBs from fog oil ingestion or inhalation is discountable.

Indirect Effects

As stated above, at temperatures between 0-40°C, 30-40% of fog oil evaporates in the air within an hour, and 80-90% evaporates within a week (Driver et al. 1993). Retention of fog oil may vary by soil type (Driver et al. 1993). Chemicals known to occur in fog oil did not appear in soil samples, or were generally present in the same concentrations at exposure and control sites from Fort McClellan, Alabama (3D/Environmental 1996). For the few chemicals where significant differences were observed between exposure and control sites, the control site had greater concentrations of most chemicals. Similarly, snow core samples were taken along roadways in Fairbanks, Alaska, and at Fort Greely, Alaska, during fog oil training. Total petroleum hydrocarbon concentrations in the urban snow samples were 450 times greater than the maximum total petroleum hydrocarbon concentration measures in snow exposed to fog oil training (Douglas et al. 2006). Overall, the chemical concentrations detected at Fort McClellan were very low and indicate no fog oil hydrocarbons are concentrating in the soil (3D/Environmental 1996). There was also no statistically significant difference in concentrations of fog oil hydrocarbons sampled from vegetation or insects at Fort McClellan (3D/Environmental 1996). Fog oil is biodegraded by microorganisms and is soluble in water where it undergoes chemical degradation (3D/International, Inc. 1997a). Impacts to localized (<0.1 km [.06 mile]) insect populations may occur if insects are coated with fog oil; however, the volatile nature of fog oil aerosols suggests that impacts would be attenuated rapidly (Driver et al. 1993). Given the amount of suitable foraging habitat available, and the anticipated highly localized, short-term impacts to insect populations, we do not anticipate any indirect effects to NLEBs from fog oil deployed during periods when NLEBs are not present.

Category 2

Direct Effects to Roosting Bats

The timing of smoke operations greatly influences the likelihood of exposure and the extent of impacts on individual bats and their populations. All smoke exercises are primarily conducted during daylight hours while bats are roosting; however, there is potential for use of smoke at night. Category 2 smoke may be deployed during the NLEBs active season.

The location of smoke operations also influences the likelihood and extent of impacts. The use of Category 2 smoke will not be used within 100 meters of any known NLEB roost areas between April 16 - October 15. This prevents exposure to adult and juvenile NLEBs in all known roosts.

Category 2 smoke may not be used within 100 meters of any forested areas within the LTAs between April 15 - October 15, (with the exception of use at the mobile MOUTs as identified below). This prevents exposure to adult and juvenile NLEBs in unknown roosts in the LTAs.

Category 2 smoke may be periodically used at four mobile MOUTs within the LTAs during April 15 - October 15. Only infrequent use of colored smoke is expected to be used in/around the mobile MOUTs. With the exception of the Category 2 colored smoke used at the mobile MOUTS, no other smoke or obscurant may be used in the BCA.

The Army's conservation measures greatly reduce exposure risk of NLEBs to Category 2 smoke, but it is not completely discountable. Therefore, we must consider the potential effects of exposure.

Overall data on the toxicity of colored smoke and TPA is limited; however, there is concern about effects regarding dermal and respiratory-tract sensitization (National Research Council 1999b). From the available information, it appears colored smoke has varying effects to small mammals dependent on color type and formulation (National Research Council 1999b). Some symptoms that were observed in mammals after a variety of exposure trials (e.g., ingestion, dermal application, inhalation) included reduced growth rate in juveniles, respiratory afflictions, and sensitization of skin. An Ecological Risk Assessment prepared by 3D/International (1997b) found there may be possible effects of inhalation of M18 colored smoke to Indiana bats from acute exposure (minor respiratory inflammation) and/or chronic exposure (slight decrease in body weight gain or minor respiratory irritation). We would expect similar effects to NLEBs. Because the potential toxicity of colored smoke is unknown, it was recommended by the Subcommittee on Military Smokes and Obscurants (National Research Council 1999b) that soldiers only use colored smoke for signaling and marking and not obscuring. This measure was to minimize exposing soldiers to colored smoke before appropriate acute toxicity and inhalation studies could be conducted. By using colored smoke as a signaling/marking tool, it will not be broadly dispersed, which also minimizes the risk of smoke exposure to NLEBs. M18 colored smoke grenades have >98% burn efficiency, indicating that nearly all chemical components are converted to smoke, leaving little residue that could end up on fur and possibly ingested (3D/International 1997a). An ecological risk assessment of M18 colored smoke grenades found that ingestion and dermal absorption were unlikely, and inhalation is the most likely path of exposure of colored smoke for Indiana bats (and presumable NLEBs) (3D/International 1997a).

Although no adverse effects are anticipated to bats within the known roosts within TA 4, and future roosts will be protected as they are found, bats in currently unidentified roosts may be adversely affected by colored smoke. The NLEBs may roost in the TA where colored smoke deployment may occur. As discussed in the fog oil section, Dickinson et al. (2009) found that radio-tracked NLEBs flushed shortly (within 10 minutes) after prescribed fire ignition within 20 meters of roosts in the Daniel Boone National Forest in Kentucky on a warm spring day. Given that colored smoke typically lasts only 2 minutes in duration, NELBs may or may not flush from roosts. If colored smoke or other smoke grenades are deployed within 30 meters (98.4 feet) of the unknown roosts, bats may inhale unsafe quantities of smoke, which could result in minor respiratory changes (3D/International 1997a). Unsafe concentrations of smoke produced by M18 grenades last approximately 1 minute (3D/International 1997a). Therefore, based on the above discussion, we find that colored smoke operations may result in minor injury (e.g., respiratory irritation) to a small number of NLEBs in unknown roosts in the TA.

While minor effects may occur from short-term exposure, effects from chronic exposure are not expected because NLEBs are not anticipated to sustain repeated exposures of Category 2 smoke. This is because there is only a small probability that any NLEBs will be in close proximity (<30 meters [98.4 feet]) to a given Category 2 smoke deployment. As Category 2 smoke operations may occur throughout the TA, we would not anticipate the same individual bat to routinely occur in close proximity to repeated deployments in different locations. In their

Ecological Risk Assessment, 3D/International (1997a) similarly determined there would be no chronic effects from M18 colored smoke to Indiana bats.

Direct Effects to Foraging Bats

In the BCA, smoke will not be used within 100 meters of forested areas during the non-hibernation season, but could be used at the three MOUTs (Figure 7) between April 15 – October 15 (only one of which is located within the BCA and 100 meters from forested areas). However, Category 2 smoke typically lasts only approximately 2 minutes in duration, making the likelihood of exposure extremely limited even if bats were flying near the MOUTs. Further, if Category 2 smoke is deployed near where NLEBs are foraging, bats have the ability to avoid these areas and are expected to forage in adjacent areas, thus limiting exposure. We do not anticipate any short term displacement (should it occur) to rise to the level of an adverse effect to NLEBs given the vast amount of suitable foraging area available on Fort Drum. Given these considerations, the likelihood that Category 2 smoke would have adverse effects to foraging NLEBs is discountable.

Indirect Effects

We do not anticipate any indirect effects to NLEBs from Category 2 smoke operations. Category 2 smoke deployments last 2 minutes in duration and no long term impacts after deployment are anticipated. Prey species are unlikely to be affected by exposure to TPA in smoke through aquatic pathways (3D/International 1997b). The primary combustion products of TPA are carbon monoxide, carbon dioxide, sulfur dioxide, benzene, toluene, and formaldehyde, and are released in a gaseous state. If small quantities enter groundwater or surface water systems, they will be biodegraded by microorganisms (3D/International 1997a). Given the amount of suitable foraging habitat available, and the anticipated highly localized, short-term (if any) impacts to insect populations, we do not anticipate any indirect effects to NLEBs from Category 2 smoke operations that occur when NLEBs are not present.

Category 3

Direct Effects to Roosting Bats

The timing of smoke operations greatly influences the likelihood of exposure and the extent of impacts on individual bats and their populations. All smoke exercises are primarily conducted during daylight hours while bats are roosting; however, there is potential for use of smoke at night. Category 3 smoke may be deployed during the NLEB active season.

The location of smoke operations also influences the likelihood and extent of impacts. Currently, the use of WP is restricted to the ranges or the Main Impact Area and is used infrequently. As noted above, NLEBs are presumed to be absent from these areas. However, wind may disperse WP from the Main Impact Area; therefore, we must consider the potential effects of exposure.

The WP ignites when it is exposed to air, and smoke typically lasts up to 15 minutes. The WP can result in severe burns if it comes into contact with the skin, and it is highly toxic if ingested (National Research Council 1999a). Inhalation studies of WP on mice, rats, and goats showed signs of respiratory tract irritation (National Research Council 1999a).

Although no adverse effects are anticipated to bats within the known roosts within the TA 4, bats in currently unknown roosts near the Main Impact Area may be adversely affected by WP Category 3 smoke. Given the reduction in populations from WNS, there are few NLEBs remaining on Fort Drum, and the likelihood that NLEBs happen to be roosting in close proximity to WP deployment within the Main Impact Area is low but not discountable. However, small numbers of NLEBs may be roosting in these areas. The NLEBs roosting in close proximity to WP deployment would be exposed to higher concentrations of smoke. Dickinson et al. (2009) found that radio-tracked NLEBs flushed shortly (within 10 minutes) after prescribed fire ignition within 20 meters of roosts in the Daniel Boone National Forest in Kentucky on a warm spring day. Deployment of WP near roosts would most likely cause adult NLEBs to similarly flush from the roost with minor or no direct injury. However, even short duration of exposure can result in severe skin irritation and burns. The WP smoke can last for minutes at a time depending on how it is deployed, making the likelihood of exposure potentially higher. If adults become irritated enough to abandon a roost, non-volant young could be left behind. Also, if WP is used in early spring when bats are more likely to enter torpor periodically, some adults may be exposed to longer duration of WP exposure. Also, if deployment occurs in June/July (when adults are likely to move, but when there are also non-volant pups present) if there are pups that adults fail to move, these pups may be injured or killed directly by WP (smoke and burns), or indirectly by the adults abandoning the roost. If NLEBs flush during the day, that would also pose additional risk of predation to the adults.

Direct Effects to Foraging Bats

Currently, the use of WP is restricted to the Main Impact Area and is used infrequently, although wind could disperse WP out of those areas. If NLEBs are foraging in the TA and encounter a Category 3 smoke deployment, there is a possibility that bats could be exposed to potentially harmful chemicals. However, bats are anticipated to avoid these areas, thus limiting exposure. We do not anticipate any short term displacement (should it occur) to rise to the level of an adverse effect to NLEBs given the vast amount of suitable foraging area available on Fort Drum. There are large areas of suitable foraging habitat throughout the TA. As such, Category 3 smoke may affect, but should not adversely affect, NLEBs as they forage.

Indirect Effects

We do not anticipate any indirect effects to NLEBs from WP. The WP smoke lasts 15 minutes and no long term impacts after deployment are anticipated. Given the location of WP deployment (within the Main Impact Area), NLEBs are not anticipated to forage in locations of deployment. Should any WP smoke disperse from the deployment area, it would only enter a small fraction of available foraging habitat. Given the amount of suitable foraging habitat available, and the anticipated highly localized, short-term (if any) impacts to insect populations,

we do not anticipate any indirect effects to NLEBs from Category 3 smoke operations when NLEBs are not present.

CUMULATIVE EFFECTS

Cumulative effects include the combined effects of any future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation under Section 7 of the ESA.

Numerous land use activities that affect the NLEB, and that likely occur within the action area, include hunting and other outdoor recreation, agriculture, timber harvest, and residential and commercial development. Many of these are private actions, but many involve Corps permits pursuant to Section 404 of the Clean Water Act for impacts to waters of the United States. The Service is unaware of any quantifiable information relating to the extent of private timber harvests within the action area. The Service is actively involved with reviewing most, if not all, development projects within the Town of LeRay and other adjacent towns (regardless of other federal [e.g., Corps] involvement). We are working with these towns and developers to conserve and connect suitable Indiana bat and NLEB habitat whenever possible.

SUMMARY OF EFFECTS

Impacts to Individuals

Potential effects of the action include direct effects to NLEBs present within the action area when activities are being conducted. Direct effects include mortality, injury, harm, or harassment as a result of active season tree removal or smoke operations.

The Army has included multiple conservation measures to reduce this potential, and the overall potential for direct mortality of NLEBs from these activities is low. The potential for direct effects from all smoke operations is greatest during spring and early summer when bats return from hibernation, spring temperatures result in periodic use of torpor, and non-volant young may be present (mid-April to July). In addition, bats impacted by WNS have additional energetic demands and reduction in flight ability. Most effects are minor throat irritation or fleeing from roosts, which, though resulting in impacts to individual bats, do not rise to the level of take because feeding, breeding, and/or sheltering activities are not impaired. There is potential for deployment of smoke in June/July in close proximity to unknown NLEB roosts, resulting in the death of a small number of pups. No active season clearing will occur until late summer when colonies are dispersed.

The continued implementation of the Army's monitoring effort will provide additional information on the effect of the Army's actions on affected bats. No cumulative effects are expected.

While analyzing the effects of the proposed action, we identified the life stages that would be exposed to the stressors associated with the proposed action, and analyzed how those individuals would respond upon exposure to the stressors. From this analysis, we determined that:

1) There is no proposed critical habitat for the NLEB, and thus, none will be adversely affected.

2) No hibernating bats nor their hibernacula will be exposed to the project stressors as there are no hibernacula within the vicinity of the Action Area.

3) The NLEBs during the late summer will be exposed to stressors from tree removal, and during the spring-fall period will be exposed to stressors from smoke operations. The NLEBs are likely to adversely respond to some of these stressors. As stated in the **Environmental Baseline**, we believe that an estimated 9-23 NLEB colonies, and an unknown number of adult males, occur in the Action Area.

Smoke - NLEBs roosting in and around the three known roosts (and any unknown roosts in the BCA) are located in areas far from any likely deployment of Category 3 smoke and obscurants. Category 1 and 2 operations will occur at least 100 meters from these roosts. However, we considered the possibility for exposure to NLEBs at currently unknown roost sites in close proximity to smoke deployment locations. If this should occur, we anticipate individual bats will experience minor respiratory irritation from exposure to Category 1, 2, or 3 smoke operations, and burns from exposure to Category 3 smoke operations. We expect harassment of a small number of bats that may flush during daylight and temporarily or permanently abandon their roosts (which may have pups). In addition, mortality of a small number of pups is possible from inhalation of the chemical smoke (primarily Category 3) or due to abandonment by adults during Category 1-3 smoke operations.

Tree Removal - All NLEBs using known roosts, and any unknown roosts west of the U.S. Military Highway, will be protected from the limited proposed active season clearing. However, we considered the possibility for exposure to NLEBs at currently unknown roost sites within active season clearings. We anticipate late summer, early fall tree removal within/up to 10 acres (4 ha) (5 acres [2.02 ha] per site) (outside of any known roosting areas) will cause bats to flee to alternate roost sites, but we do not anticipated any death or injury or significant changes in behavior to those individual fleeing NLEBs.

In summary, there will be impacts to individual bats in either their annual survival or reproductive rates.

Impacts to Populations

As we have concluded that individual bats are likely to experience reductions in either their annual or lifetime survival or reproductive rates, we need to assess the aggregated consequences of the anticipated reductions in fitness (i.e., reproductive success and survival) of the exposed individuals on the population(s) (winter and/or maternity colony) to which these individuals belong.

Many maternity colonies will not be exposed to stressors (see above) given conservation measures and locations of the proposed actions. For example, given the current NLEB location information, we anticipate that of the 9-23 colonies estimated on Fort Drum, that at least half occur in the Cantonment Area and will be protected by the smoke conservation measures. This results in 4-11 colonies potentially at risk of exposure to smoke operations. In addition, up to two colonies may be exposed to late summer tree removal. The level of anticipated take is not expected to measurably decrease the fitness of these maternity colonies because we generally do not anticipate lethal take (but instead minor throat irritation). However, there is the potential for loss of pups during smoke operations deployed in close proximity to unknown roosts in June/July. Not all pups from a given colony are likely to be exposed, as not all pups will be in the same tree on any given day, and many adults would be anticipated to move their pups. However, some portion of pups may be killed from an exposed colony. We anticipate this will be a one-time impact (not repeated) exposure for any given colony – given that training activities are dispersed and continue to move throughout and among training years. We do not anticipate a long-term reduction in any maternity colony fitness.

Impacts to the Species

Long-term reductions in any exposed maternity colony's fitness are unlikely to occur. In fact, we find that many of the proposed actions of the Army (see BA) are likely to result in benefits to the species over the long term, due to the maintenance of a mosaic of forest types, BCA, etc. Thus, no component of the proposed action is expected to reduce the reproduction, numbers, or distribution of the NLEB rangewide. While we recognize that the status of the species is uncertain due to WNS, given the environmental baseline, and the intensity, frequency, and duration of the project impacts, we find that the proposed project is unlikely to have population-level impacts, and thus, is also unlikely to decrease the overall reproduction, numbers, or distribution of the NLEB. Therefore, we do not anticipate a reduction in the likelihood of both survival and recovery of the species as a whole.

CONCLUSION

After reviewing the current status of the NLEB, the environmental baseline for the action area, the effects of the proposed activities on Fort Drum (2015-17), and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the NLEB. No critical habitat has been designated for this species, therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR §

17.3). Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered to be prohibited taking under the ESA, provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Army so that they become binding conditions of any funding, permits, and/or approvals, as appropriate, issued to any other federal agencies or contractors on Fort Drum for the exemption in Section 7(o)(2) to apply. The Army has a continuing duty to regulate the activity covered by this incidental take statement. If the Army 1) fails to require Army personnel, other federal agencies, or contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, authorization, or funding document; and/or 2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Army must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement (50 CFR §402.14(I)(3)).

AMOUNT OR EXTENT OF TAKE ANTICIPATED

If NLEBs are present or utilize an area proposed for active season clearing or smoke operations, incidental take of NLEBs could occur. The Service anticipates incidental take of the NLEB will be difficult to detect for the following reasons: (1) the individuals are small and occupy summer habitats where they are difficult to find; (2) NLEBs form small, widely dispersed, maternity colonies under loose bark or in the cavities of trees, and males and non-reproductive females may roost individually, which makes finding the species or occupied habitats difficult; (3) finding dead or injured specimens during or following project implementation is unlikely; (4) the extent and density of the species within its summer habitat in the action area is unknown; and, (5) in many cases incidental take will be non-lethal and undetectable.

Monitoring to determine actual take of individual bats within an expansive area of forested habitat is a complex and arduous task. Unless every individual tree that contains suitable roosting habitat is inspected by a knowledgeable biologist before management activities begin, it would be impossible to know if a roosting NLEB is present in an area proposed for smoke operations. Inspecting individual trees is not considered by the Service to be a practical survey method and is not recommended as a means to determine incidental take. However, the areal extent of potential roosting and foraging habitat affected can be used as a surrogate to monitor the level of take.

We anticipate mortality of a small number (e.g., 0-3 per year) of NLEB pups associated with smoke and obscurant operations conducted in June or July or NLEB adults during early spring. As explained in *Impacts to Populations* section, many colonies may not be exposed, many bats may not be exposed, and adults are anticipated to move pups in most cases.

Because of the difficulty in monitoring/detecting this level of take, the Service has decided that it is appropriate to use the locations (and all acreage within those locations) where smoke may be deployed (between April 15 and October 15) as a surrogate to measure the likelihood of take of NLEBs.
Category 1 smoke operation will be conducted >1,000 meters of the installation boundary, public roads, Cantonment Area, ammunition supply point or WSAAF.

Category 1 smoke and obscurants will be used >100 meters from any known Indiana or NLEB maternity roost areas between April 16 – October 15.

Category 2 smoke will be used >100 meters of any known Indiana or NLEB roost areas or >100 meters of any forested areas (with the exception of deployment at mobile MOUTs) between April 16 - October 15.

Category 3 smoke will occur in the Main Impact Area.

Should deployment occur in locations not described in the BA/this Opinion a manner that is out of compliance with the smoke conservation measures, incidental take may be exceeded.

EFFECT OF THE TAKE

In the accompanying Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to NLEBs. No critical habitat has been designated for NLEBs, so none would be impacted.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the NLEB.

1. The Army will ensure that the described proposed project components, including all conservation measures, will occur as planned and documented in the 2014 BA.

2. The Army must monitor its activities associated with the proposed project to determine if the Terms and Conditions of this Opinion are being implemented adequately in order to ensure that take is minimized, and provide an annual report of those activities to the Service.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the ESA, the Army (and other federal agencies where denoted) must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. The Army Environmental Division shall provide annual training to appropriate personnel for actions conducted on Fort Drum on the terms of this Opinion and all conservation measures described in the BA. Due to the number of soldiers and other military and support personnel, it is not expected nor required to train all personnel working on Fort Drum, but focused on those that are directly or indirectly responsible for carrying out projects or actions described within the BA. It is expected that this training is offered through a variety of outlets, that include, but are not limited to: soldier in processing; environmental compliance officer training; company commander first sergeant training; brigade commander battalion training; and, the officer-in-charge, range safety officer certification.

2. The Army shall ensure that all appropriate/applicable conservation measures and Terms and Conditions are included in appropriate documents for work conducted on Fort Drum. It is expected that this would include, but not be limited to: military training regulations, Record of Environmental Consideration documents, and contracts. This Term and Condition is associated with Reasonable and Prudent Measure 1.

3. The Army shall ensure they maintain a valid NYSDEC permit for the handling of NLEBs. This Term and Condition is associated with Reasonable and Prudent Measures 1 and 2.

4. The Army shall monitor the presence of NLEBs annually. The Army will coordinate with the Service on monitoring methods by March 1st of the survey year. This Term and Condition is associated with Reasonable and Prudent Measures 1 and 2.

5. The Service and NYSDEC shall have access to future NLEBs on-post monitoring projects. All access shall be coordinated with the Army's Environmental Division. This Term and Condition is associated with Reasonable and Prudent Measures 1 and 2.

REPORTING REQUIREMENTS

1. The Army shall provide an annual report summarizing the likely to adversely affect activities described in this Opinion by March 1 (of the following year). The report shall also summarize whether any conservation recommendations were implemented. The Army shall also provide an annual report summarizing the not likely to adversely affect activities in accordance with this Opinion and our February 18, 2015, concurrence letter for the Indiana bat.

2. The Army shall provide an annual report summarizing any NLEB field work (e.g., mist-netting, Anabat, and radio telemetry activities) by March 1 of the following year.

3. The Army may request an extension, for the Service's consideration, to the time limitations in meeting the requirements outlined in all terms and conditions. An extension request shall be provided to the Service in writing within 1 year from the completion date of this Opinion clearly identifying the additional timeframe needed.

4. The Army and any other federal agency working on Fort Drum shall make all reasonable efforts to educate personnel to report any sick, injured, and/or dead bats (regardless of species) located on Fort Drum during construction, operations, maintenance, or monitoring activities immediately to the Army's Environmental Division. Due to the number of soldiers and other military and support personnel, it is not expected nor required to educate all personnel working on Fort Drum, but those most likely to come across bats during the course of normal working conditions will receive this training. Environmental staff will subsequently report to the Service's New York Field Office (NYFO) (607-753-9334), the NYSDEC, and/or the New York State Health Department. No one, with the exception of trained Army Garrison staff or researchers contracted to conduct bat monitoring activities, should attempt to handle any live bat, regardless of its condition. If needed, NYFO and/or NYSDEC will assist in species determination for any dead or moribund bats. Any dead bats believed to be NLEBs will be transported on ice to the NYFO or NYSDEC. If an NLEB is identified, NYFO will contact the appropriate Service law enforcement office. In addition, Fort Drum Environmental Division Staff will make all reasonable efforts to immediately report any dead suspected Indiana bats or NLEB found outside Fort Drum but within the Action Area. In the extremely rare event that someone has been bitten by a bat, please keep the bat in a container and contact the Jefferson County Public Health Service at 315-786-3770.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid the adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

The Service has identified the following actions that, if undertaken by the Army, would further the conservation of the NLEB.

1. Assist with WNS investigations. For example, Fort Drum could:
    a. Monitor the status/health of the little brown bat colony at the LeRay mansion/bat houses;
    b. Collect samples for ongoing or future studies;
    c. Provide funding for off-post WNS research activities; and
    d. Allow staff to participate in off-post research projects.

2. Pursue additional acquisition of parcels or easements to protect NLEB roosting, foraging, and commuting habitat through the ACUB program.

3. Conduct research on smoke/obscurant impacts to the NLEB. As stated in Shapiro and Hohmann (2005), additional work on short-term and long-term exposure models is necessary. Research on potential impacts to insect populations is also recommended.

4. Conduct research on the summer habitat requirements and distribution of NLEBs on Fort Drum.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the conservation recommendations carried out.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the information presented with the September 22, 2014, request for initiation of formal consultation. As written in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law), and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals the agency action may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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APPENDIX A. FORT DRUM BIOLOGICAL ASSESSMENT

U.S. Army Garrison Fort Drum. 2014. Biological Assessment on the proposed activities on Fort Drum Military Installation, Fort Drum, New York, (2015-2017) for the Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*). - *Available electronically.*

APPENDIX B. CONSULTATION AND CONFERENCE HISTORY

The following comprises the consultation and conference history for activities proposed on Fort Drum between 2015-17 since the issuance of our 2012 Biological Opinion (Opinion).

On **February 2, 2012**, the Service issued an Opinion to Fort Drum.

On **February 14, 2012**, the Army submitted the 2011 annual report in accordance with the 2009 Opinion.

On **February 1, 2013,** the Army submitted the 2012 annual report in accordance with the 2012 Opinion.

On **March 20, 2013,** the Service sent a letter to the Army acknowledging the February 2013 submittal.

On **May 6, 2013**, the Army submitted the 2012 annual report of NLTAA activities in accordance with the 2012 Opinion.

On **May 29, 2013**, the Service sent a letter to the Army acknowledging the May 2013 submittal.

On **June 25, 2013**, the Service attended ACUB biennial review.

On **November 11, 2013**, the Army and Service held a call to discuss northern long-eared bat.

On **February 1, 2014**, the Army submitted the 2013 annual report in accordance with the 2012 Opinion.

On **February 20, 2014**, the Service sent a letter to the Army acknowledging the February 2014 submittal.

On **May 14, 2014**, the Army submitted the 2013 annual report of NLTAA activities in accordance with the 2012 Opinion.

On **June 10, 2014**, the Service sent a letter to the Army acknowledging the May 2014 submittal.

On **July 10, 2014**, the Army and the Service met to discuss development of the 2015-2017 BA.

On **July 22, 2014**, the Army and the Service held a call discuss development of the 2015-2017 BA.

On **September 24, 2014**, the Service received the Army's September 22, 2014, BA and request for concurrence that activities are not likely to adversely affect the Indiana bat and request for initiation of formal conferencing for the northern long-eared bat for 2015-2017 activities on Fort Drum.

On **October 15, 2014**, the Service sent the Army a letter confirming that adequate information was provided to initiate conferencing/consultation.

On **February 9, 2015**, the Army submitted the 2014 annual report in accordance with the 2012 Opinion.

On **February 18, 2015**, the Service sent the Army a letter concurring that projects in the BA are not likely to adversely affect the Indiana bat and acknowledged the February 9, 2015, submittal.

On **March 5, 2015**, the Service received the Army's 2014 annual report of NLTAA activities in accordance with the 2012 Opinion.

APPENDIX C. Concentration of TPA at Varying Distances (3D/International, Inc. 1997).

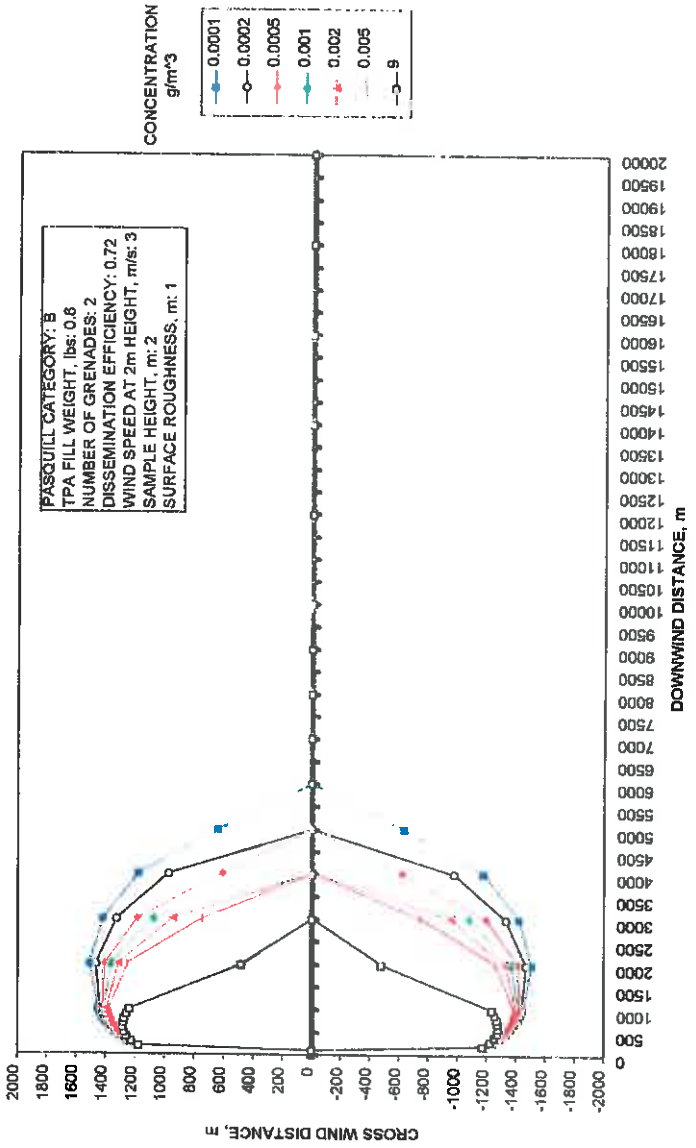

FIGURE 31. Concentration of terephthalic acid from smoke grenades (Pasquill B) at varying distances from smoke grenade training locations.

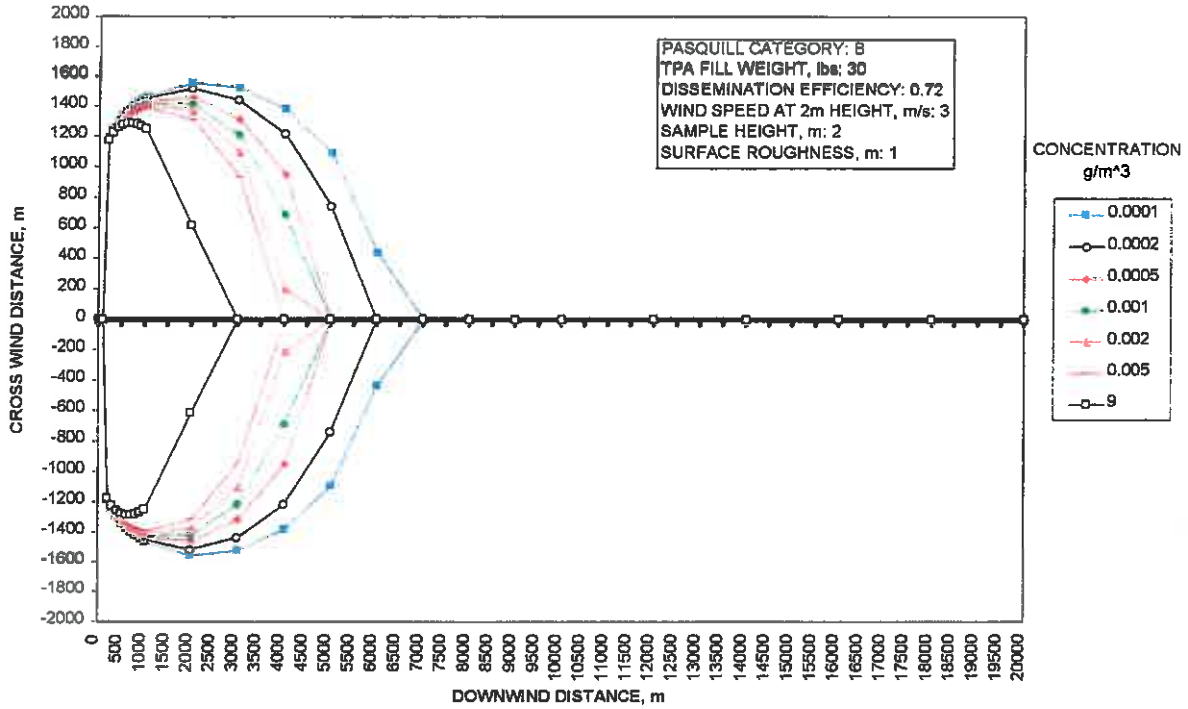

FIGURE 32. Concentration of terephthalic acid from smoke pots (Pasquill B) at varying distances from smoke pot training locations.